METEOROLOGICAL OFFICE
27 OCT 1966
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# MINUTES OF THE PROCEEDINGS

OF THE

# METEOROLOGICAL COUNCIL,

## 1891—1892.

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE.
BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

1893.

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Office

# MINUTES OF THE PROCEEDINGS

OF THE

# METEOROLOGICAL COUNCIL.

## 1891—92.

63, *Victoria Street, April* 8, 1891.

PRESENT:

MR. GALTON IN THE CHAIR.

PROFESSOR DARWIN. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 18) were read and confirmed.

Read—Letter 580 from Sir John Lubbock, asking if the Office could assist the London County Council in erecting public meteorological instruments in the parks under that Council.

Mr. Scott stated that he had replied (P.C. 640), requesting that someone from the County Council would give further particulars.—Approved.

Read—Letter 639 from Mr. Dines, with a report on his experiments (Minutes, 1890, p. 28).—The report was referred to Mr. Darwin.

Reported—(M.O. 584)—That the chronometer supplied to Falmouth (Minutes, 1886, p. 52) had been sent up to be cleaned.—Mr. Scott was instructed to pay for the work.

Mr. Scott submitted the invitation to, and programme for, the proposed Meteorological Congress at Munich, to commence August 26. (Letters 1989/90 and 615/91.)

Read—A letter from Mr. Baillie, stating that since last meeting nine logs had been received, eight of them being "excellent."

Mr. Scott was directed to present the charts to Mr. Gilpin-Brown, H.M.S. "Egeria," and to convey the best thanks of the Council to the other observers.

Read—A memorandum (M.O. 650) from Mr. J. Curtis as to the condition of the records of the self-recording rain-gauges, owing to the gradual perishing of the coating with which the papers are covered.—Mr. Scott was instructed to refer the matter to Messrs. De La Rue for their remarks.

Submitted—The following summary, as a result of the provisional checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

| | | |
|---|---|---|
| A + B (successful) | - - | = 36 districts. |
| C (failures) | - - | = 15 do. |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
April 8, 1891.

E 66711. 25.—6/91. Wt. 433. E. & S. A

Submitted—The following report on the 8.30 p.m. forecasts for March 1891:—

The letters used have the following signification :—

a=complete success. | c=partial failure.
b=partial (*i.e.*, more than half) success. | d=total failure.

MARCH.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 32 | 71 | 52 | 89 |
| ,, | b | 52 | 23 | 37 | |
| ,, | c | 10 | 3 | 7 | |
| ,, | d | 6 | 3 | 4 | |
| Scotland, E. | a | 32 | 71 | 52 | 78 |
| ,, | b | 36 | 16 | 26 | |
| ,, | c | 29 | 7 | 18 | |
| ,, | d | 3 | 6 | 4 | |
| England, N.E. | a | 39 | 71 | 55 | 81 |
| ,, | b | 32 | 20 | 26 | |
| ,, | c | 29 | 3 | 16 | |
| ,, | d | 0 | 6 | 3 | |
| England, E. | a | 39 | 71 | 55 | 86 |
| ,, | b | 39 | 23 | 31 | |
| ,, | c | 22 | 6 | 14 | |
| ,, | d | 0 | 0 | 0 | |
| Midland Counties | a | 26 | 61 | 44 | 79 |
| ,, | b | 45 | 26 | 35 | |
| ,, | c | 26 | 13 | 20 | |
| ,, | d | 3 | 0 | 1 | |
| England, S. | a | 35 | 55 | 45 | 89 |
| ,, | b | 55 | 32 | 44 | |
| ,, | c | 10 | 10 | 10 | |
| ,, | d | 0 | 3 | 1 | |
| Scotland, W. | a | 29 | 58 | 44 | 78 |
| ,, | b | 52 | 16 | 34 | |
| ,, | c | 13 | 20 | 16 | |
| ,, | d | 6 | 6 | 6 | |
| England, N.W. | a | 26 | 74 | 50 | 78 |
| ,, | b | 45 | 10 | 28 | |
| ,, | c | 23 | 13 | 18 | |
| ,, | d | 6 | 3 | 4 | |
| England, S.W. | a | 42 | 71 | 57 | 81 |
| ,, | b | 29 | 19 | 24 | |
| ,, | c | 19 | 0 | 10 | |
| ,, | d | 10 | 10 | 10 | |
| Ireland, N. | a | 45 | 81 | 63 | 86 |
| ,, | b | 39 | 7 | 23 | |
| ,, | c | 13 | 6 | 10 | |
| ,, | d | 3 | 6 | 4 | |
| Ireland, S. | a | 45 | 74 | 60 | 86 |
| ,, | b | 36 | 16 | 26 | |
| ,, | c | 13 | 7 | 10 | |
| ,, | d | 6 | 3 | 4 | |
| Summary. | | | | | |
| British Isles | a | 35 | 69 | 52 | 83 |
| ,, | b | 42 | 19 | 32 | |
| ,, | c | 19 | 8 | 13 | |
| ,, | d | 4 | 4 | 4 | |

**Submitted—The following statements of work during the month of March 1891:—**

MARINE BRANCH.

April 7, 1891.

**Examined** 12 new logs and 4 lighthouse registers.

**Extracting** information from Office and also from Admiralty logs in the district between the Cape of Good Hope and New Zealand.

**Charting** currents in all oceans from Admiralty logs, the number of volumes supplied by the Public Record Office during the month being 428.

**Obtaining** particulars relating to the changes of sea temperature in the neighbourhood of Perim.

The whole of the lithographed charts of sea temperature, &c. round Cape Guardafui examined and returned to printers for revise.

**Preparing** diagrams for the Naval Exhibition.

**Indexing** data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council,

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING BRANCH.
(To 31st March 1891.)

April 8, 1891.

*Monthly Weather Report*, 1887.—Completed, revised, with title page, preface, &c., and gone "for press."

*Weekly Weather Report*, 1891.—All numbers promptly issued to date. *Monthly Supplements* for January and February written.

*Daily Weather Report*, 1891.—All numbers issued to date, with corrections and additions up to those for February.

*Primary Checking of Storm Warnings.*—Done to date.

*Primary Checking of Forecasts* (8.30 *p.m.*).—Done to date.

*Completing Averages of Pressure, Temperature, Rainfall, Bright Sunshine, and Accumulated Heat*, and plotting same on curves for use in preparing Weekly Weather Report, 1891. In progress, as required.

*Preparing Maps, &c. for Royal Naval Exhibition*, and various other minor undertakings including re-arranging plan for issuing storm warnings on Sunday mornings.

*Revising new Instructions in Meteorological Telegraphy.*—About three-fourths done.

*Hay Harvest Forecasts*, 1890.—Checking; completed, and return handed in.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

April 1, 1891.

*Hourly Means.*

The reading of the proofs of this work for 1887 is completed, and the introduction is now the only part which remains with the printer. The calculation of the various means for 1888 is still being carried on.

*Harmonic Analysis of Hourly Readings.*

The proofs of the table of this work have all been passed for press. The publication is delayed for a memoir now being prepared.

*Miscellaneous.*

Gale tables for Part IV., 1880, of the Quarterly Weather Report have been prepared.

The usual routine work of the room has been kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

April 1, 1891.

*Examinations.*

*February* and *March* 1891.—Partly examined.

Weekly examination (on receipt) of curves and documents.

*Reports.*

*January* 1891.—Copies of "Notes of Errors" to all observatories.

*General.*

The computations in connexion with the diurnal range of rainfall, 1881–1890, completed.

Various routine matters have occupied much of Messrs. Parsons and Hewitt's time.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting:—

*Paris, Bureau Central Météorologique.*—Annales, 1888, i.–iii.

*Oviedo, Estación Meteorológica.*—Resúmen de las observaciones verificadas desde el 1851 á 1890, por D. Luis G. Frades.

*Wild, H.*—Inductions—Inclinatorium neuer Construction und Bestimmung der absoluten Inclination mit demselben in Pawlowsk.

*Marseilles, Commission de Météorologie du Département des Bouches-du-Rhone.*—Bulletin annuel. 1889.

*Wild, H.*—Über die Benutzung des electrischen Glühlichts für photographisch-selbstregistrirende Apparate.

*Vilafranca del Panadès, Estación Meteorológica.*—Observaciones efectuadas en dicha Estación durante el año 1890, publicadas por D. J. Baltá R. de Cela.

*Paris, Comité International des Poids et Mesures.*—Treizième rapport aux Gouvernements signataires de la convention du mètre sur l'exercice de 1889.

*Schoenrock, A.*—Untersuchung der Hochwasser in St. Petersburg, 1878–90.

*Buchan, A.*—The meteorological results of the "Challenger" Expedition in relation to physical geography.

*Zendejas, J.*—Tablas psycrométricas calculadas para la altura de México.

*Rugby School Natural History Society.*—Report. 1890.

*Prince, C. L.*—The summary of a meteorological journal kept at Crowborough, Sussex. 1890.

*Batavia, Magnetical and Meteorological Observatory.*—Observations. Vol. xii. 1889.

—— —— Regenwaarnemingen in Nederlandsch-Indië. 1889.

*Bergmann, R.*—Über die Abweichungen der Temperaturen und Niederschlags-mengen im europäischen Russland von ihren Normalwerthen während des Frühlings und Sommers 1890.

*Jenkins, B. G.*—The British weather chart, 1891.

*Adelaide Observatory.*—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the Northern Territory, under the direction of C. Todd. 1883, 1888.

*Berlin, Deutsche Meteorologische Gesellschaft.*—Berliner Zweigverein der Deutschen Meteorologischen Gesellschaft. 1891.

*Hellmann, G.*—Tägliche Periode der Monatsextreme des Barometerstandes.

*Riggenbach-Burckhardt, A.*—Höhenmessung von Gewitter-Cumulus-Wolken.

—— Der Winter, 1890–91.

*Pouchet, G.*—Rapport sur le fonctionnement du Laboratoire de Concarneau en 1889 et sur la sardine.

63, *Victoria Street, April* 22, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. GALTON. |
| PROFESSOR DARWIN. | MR. STONE. |

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 8) were read and confirmed.

Reported—That the letter to the Agricultural Department *re* Hay Harvest Forecasts, as directed Minutes, p. 91, 1890, had been sent on the 10th instant (P.C. 707), but that no reply had yet been received.

Read—Letter 726, from Mr. Symons, inquiring if the Council proposed to issue a supplement to the Rainfall Tables of the British Isles (Minutes, 1879, p. 122; 1880, p. 1; 1887, p. 109).

Mr. Scott was instructed to ask what number of stations were available, and what the probable cost would be (P.C. 787).

Read—Letter 686, from the Treasurer of the Royal Society, stating that the purchase of Westwood House was not yet completed (Minutes, 1890, p. 88).

Read—Letter 747, from Mr. Cullum, asking when he was to come over to receive instructions as to the arrangements for the new observatory.

Mr. Scott was instructed to inform Mr. Cullum (P.C. 789) that no arrangements could be made till the purchase was completed, and to instruct him to submit to the Council by letter his plans for the apportionment of the new house.

The first draft of the Report of the Office for the year ending March 31, 1891, was submitted.—To be reconsidered May 27.

Read—A letter from Messrs. De La Rue (Minutes, p. 1), stating that they could not suggest any better mode of preparing rain-gauge papers than that hitherto adopted. The matter was referred to the Kew Committee, with a view to their testing the possibility of using metallic pens and ink instead of pencil.

Reported—That the instruments had been removed safely to Deerness from Stenness in the Orkney Islands (Minutes, 1890, p. 91), Letter 734.

Read—The following letter (Minutes, 1890, p. 88):—

(M.O. 517.)

The Royal Society,
Burlington House, March 18, 1891.

SIR,

IN answer to your letter of February 26th, requesting the President and Council to give their assent to an application being made to the Board of Trade for a license under the Companies Act to grant the Meteorological Council the status of a corporation, I am directed to inform you that at a recent meeting of the Council it was agreed to assent to this proposal.

I am, &c.
(Signed) M. FOSTER,
Secretary, Royal Society.

Robert H. Scott, Esq., F.R.S.,
Secretary, Meteorological Council.

Mr. Scott was instructed to forward the application for the registration of the Council to the Board of Trade. (P.C. 806.)

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

| | |
|---|---|
| A + B (successful) - - - - | = 0 |
| C (failure) - - - - | = 2 |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
22nd April 1891.

Submitted—The following statement of accounts for the year ending 31st March 1891 :—

| Income. | £ s. d. | £ s. d. | Expenditure. | £ s. d. | £ s. d. |
|---|---|---|---|---|---|
| Balance from year 1889–90 | - - | 2,718 13 8 | Administration : | | |
| Vote for year - - | - - | 15,300 0 0 | Payment of Council - | 988 15 0 | |
| Repayment of expenses charged under— | | | Secretary - - | 800 0 0 | |
| (1.) Incidental expenses | 14 13 2 | | Salaries and wages - | 789 14 0 | |
| (2.) Special researches - | 2 3 11 | | Rent, fuel, and lighting - | 726 10 3 | |
| (3.) Observatories - | 24 5 10 | | Furniture and fittings - | 410 5 6 | |
| (4.) International meteorology - - | 32 4 0 | | Incidental and contingent expenses - | 379 18 7 | |
| | | 73 6 11 | Expenses incidental to International Meteorological Congress | 69 13 8 | |
| Supply of Weather Information : | | | Pensions - - | 186 16 4 | |
| D.W. Charts and Forecasts - - | 245 6 4 | | | | 4,351 13 4 |
| 6 p.m. Charts - | 25 0 0 | | Special Researches - | - - - | 952 17 2 |
| Information for Press Agencies, &c. - | 127 17 0 | | Land Meteorology : | | |
| Telegrams - - | 200 2 8 | | Observatories and stations - - | 2,189 17 10 | |
| | | 598 6 0 | Discussion and reduction of observations - | 1,246 18 0 | |
| Sale of Instruments, &c. : | | | | | 3,436 15 10 |
| Royal Navy account - | 32 7 0 | | Weather Information and Forecasts : | | |
| Mercantile Marine account - - | 48 10 7 | | Telegraphic reports and storm warnings -* | 2,547 13 3 | |
| | | 80 17 7 | Preparation and issue of reports and forecasts - - | 1,810 10 8 | |
| Commission charged on work done for Colonies, &c. - - | - - | 37 14 9 | | | 4,358 3 11 |
| | | | Inspections : | | |
| | | | Salaries and travelling - | - - - | 706 8 9 |
| | | | Ocean Meteorology : | | |
| | | | Discussion and reduction of observations - | 1,608 0 0 | |
| | | | Expenses incidental to the supply of instruments : | | |
| | | | Proportion for care and issue of instruments - | 200 0 0 | |
| | | | Royal Navy - | 360 19 11 | |
| | | | Mercantile Marine | 200 8 2 | |
| | | | Distant island and coast stations - | 5 14 8 | |
| | | | | | 2,375 2 9 |
| | | | Balance - - - | - - - | 2,627 17 2 |
| | | £18,808 18 11 | | | £18,808 18 11 |

| Liabilities. | £ s. d. | Assets. | £ s. d. |
|---|---|---|---|
| To contracts and outstanding accounts - | 146 16 4 | By cash at Bank - - - - | 3,024 12 4 |
| „ Post Office (partly estimated) - | 287 16 10 | „ „ at Office - - - - | 76 8 10 |
| „ sundry creditors - - - | 237 1 0 | „ sundry debtors - - - | 198 10 2 |
| „ balance - - - - | 2,627 17 2 | | |
| | £3,299 11 4 | | £3,299 11 4 |

* Some expenses under this head not yet brought to account.

**Read**—A letter from Mr. Baillie, stating that since last meeting three logs had been received, all of them being "excellent." Mr. Scott was instructed to convey the marked thanks of the Council to the observers.

It was resolved that Mr. Baillie's salary be raised from 350*l.* to 400*l.*

It was resolved that the salaries of Miss M. E. Anderson and Miss Smith be allowed to rise to a maximum of 1*l.* 10*s.* by annual increments of 2*s.* per week (Minutes, 1889, p. 16). In the case of Miss Smith (appointed Minutes, 1890, p. 76) the increments are not to begin till April 1892.

It was resolved that the terms arranged for boy clerks (Minutes, 1890, p. 35) be carried out, and their pay raised to the amounts fixed for their several ages by that Minute, viz.:—

F. E. Dash to receive 15*s.* 6*d.* per week
H. A. Hewitt „ 15*s.* 6*d.* „ +4/6
A. H. Brown „ 14*s.* „
A. H. Rigby „ 12*s.* 6*d.* „

for the current year.

C. E. Goad, messenger, to receive 13*s.* per week.

All weekly increments to date from 30th March last.

The increments to the "classified" clerks referred to on Minutes 1884–85, pp. 118–9, were allowed in the following cases:—

| | Salary in 1890–91. | Proposed for 1891–92. |
|---|---|---|
| **Class I.—Maximum 275*l.*** | £ *s.* *d.* | £ *s.* *d.* |
| J. A. Curtis | 235 0 0 | 240 0 0 |
| J. E. Cullum (Minutes, 1886–7, p. 98) | 240 0 0 | 245 0 0 |
| **Class II.—Maximum 200*l.*** | | |
| H. Harries | 195 0 0 | 200 0 0 |
| W. Allingham | 195 0 0 | 200 0 0 |
| **Class III.—Maximum 150*l.*** | | |
| R. Sargeant | 145 0 0 | 150 0 0 |
| T. Sheerman | 145 0 0 | 150 0 0 |
| **Class IV.—Maximum 110*l.*** | | |
| A. H. Bell | 105 0 0 | 110 0 0 |
| F. W. Snell (Minutes, 1888–9, p. 107) | 85 0 0 | 90 0 0 |
| C. W. Heinemann (Minutes, 1886–7, p. 98) | 75 0 0 | 80 0 0 |
| L. H. Powers ( „ 1887–8, p. 120) | 65 0 0 | 70 0 0 |

Submitted—The following list of publications which had been received since the last meeting:—

*Calcutta, Meteorological Department.*—Report on the administration of the Meteorological Department of the Government of India in 1889–90.

—— —— Cyclone Memoirs. Part iii. Bay of Bengal cyclone of September 13th–20th, and October 27th–31st, 1888, and Arabian Sea cyclone of November 6th–9th, 1888.

*Bombay, Government Observatory.*—Magnetical and meteorological observations made in the years 1888 and 1889.

*Natal, Harbour Board.*—Chairman's Minute and Departmental Report for the year 1890.

*Augustin, F.*—Über die Schwankungen des Wasserstandes der Moldau.

*Clark, J. E.*—The wind-rush at York, March 8th, 1890, with maps and aneroidograms.

*Tiflis, Physikalisches Observatorium.*—Magnetische Beobachtungen, 1888–1889.

—— —— Meteorologische Beobachtungen, 1889.

*Milan, R. Osservatorio Astronomico di Brera.*—Osservazioni meteorologiche eseguite nell' anno 1890.

*Washington, Signal Office.*—Bibliography of meteorology. Part iii.—Winds.

*Todd, C.*—Weather forecasts. (Newspaper cutting.)

*Hann, J.*—Studien über die Luftdruck- und Temperaturverhältnisse auf dem Sonnblickgipfel, nebst Bemerkungen über die Bedeutung derselben für die Theorie der Cyclonen und Anticyclonen.

*Washington, United States Naval Observatory.*—Magnetic observations at the United States Naval Observatory, 1888 and 1889.

*Vienna, K. K. Central-Anstalt für Meteorologie und Erdmagnetismus.*—Jahrbücher. Bd. xxvi. 1889.

*Doering, O.*—La variabilidad interdiurna de la temperatura en algunos puntos de la República Argentina y de America del Sur en general. V. Variabilidad de la temperatura en San Juan. VI. Variabilidad de la temperatura en la Ciudad de Córdoba.

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63, *Victoria Street, May* 6, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (April 22) were read and confirmed.

Read—Letter 763 from Mr. Cullum (Minutes, p. 4), with plans and photographs of Westwood House, Cahirciveen.—It was resolved that Mr. Scott should visit the station before next meeting of the Council, and report as to the adaptation of the house for the purposes of the observatory.

Mr. Scott reported that he had received inquiries from Mr. W. H. Dickinson, of the London County Council, as to the erection of instruments and of notices as to geographical position, &c. in the Parks under the management of that Council. He was instructed to submit a scheme at next meeting.

Read—A letter from Mr. Symons (M.O. 777) as to the stations available for continuing the British Rainfall Tables for the ten years 1881–90.—To be considered at next meeting.

Read—A letter No. 796 from Mr. Ellis (Minutes, 1890, p. 86), stating that in his opinion the Broun Magnetical MSS. submitted to him did not contain matter calling for publication. Mr. Scott was instructed to inform the Royal Society, London, and the Royal Society, Edinburgh, as to the action taken with regard to the Broun papers. (P.C. 923 and 924.)

Read—Letter 808 from Mr. Dines with a report on his anemometer comparisons (Minutes, 1890, p. 24).—Referred to Professor Darwin.

Read—A letter from Mr. Baillie, stating that since last meeting three logs had been received, all of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Reported—That the service of daily charts twice daily to the Naval Exhibition had commenced, and that additional assistance was required on Sunday evenings.—Mr. Scott was authorised to employ Mr. Simpkins for the purpose at the rate of 4*s*. 6*d*. per Sunday (Letter 814).

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

| | |
|---|---|
| A + B (successful) - - - - - | = 7 districts. |
| C (failures) - - - - - - | = 5 " |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
6th May 1891.

Submitted—The following statements of work during the month of April 1891 :—

MARINE BRANCH.

May 5, 1891.

Examined 10 new logs.

Completing the extraction of information in Office logs for the district between the Cape of Good Hope and New Zealand, and obtaining the means of sea temperature observations. Also preparing lists of H.M. ships which have visited the district under discussion since 1862, with the view of obtaining the logs from the Public Record Office.

Charting ocean currents from Office and from naval logs, 200 volumes of the latter having been received from the Public Record Office during the month.

Arranging for the representation of gale frequency on the Red Sea Charts, and examining the data books for remarks of importance bearing on wind changes and peculiarities.

Preparing charts and diagrams for the Naval Exhibition.

Indexing data in ocean 10-degree squares.

Rendering assistance in tabulating values for the Second Order Stations for the year 1881.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To April 30, 1891.)

*Monthly Weather Report*, 1881.—Preparation of tables, maps, &c. for January 1881 in hand, half done.

*Weekly Weather Report*, 1891.—All numbers issued promptly. Appendix I., Part I., re-arranged, printed, revised, and sent forward "for press."

Monthly Summary for March half done.

*Daily Weather Report*, 1891.—All numbers issued to date. Correction and addition sheet issued, including that for March.

*Primary Checking of Storm Warnings*, 1891.—Done to date.

*Primary Checking of Forecasts* (8.30 p.m.).—Nearly ready.

*Averages of Pressure, Temperature, Accumulated Heat, Rainfall, and Bright Sunshine* and plotting same.—Still in progress, as required for Daily and Weekly Reports. Done to end of May.

*Maps and Forms for Royal Exhibition* (for daily use).—Prepared, and maps for 2-days drawn.

*Instructions in Meteorological Telegraphy*, new edition.—Issued.

*Final Checking of Storm Warnings issued in* 1890.—Commenced.

During this month the staff in this Branch have taken the bulk of their Easter holidays, and Mr. Brodie has been absent for more than a fortnight on leave, "Summer vacation."

(Signed) FREDC. GASTER.

April 6, 1891.

PANTAGRAPH ROOM.

May 1, 1891.

*Hourly Means.*—The volume for 1887 has been completed and signed for press. The calculation of the mean values for 1888 has been steadily carried on, and the tables are about half done.

*Harmonic Analysis of Hourly Readings.*—This work has not been advanced during the month.

*Miscellaneous.*—Some work done on preparation of Gale Tables for Weather Report for 1881, and also in connection with cloud measurements and anemometer results, &c. The sunshine returns have been kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S., &c.

EXAMINATION BRANCH.

May 1, 1891.

*Examinations.*

*February* and *March* 1891.—Completed.

Weekly examination (on receipt) of curves and documents.

*Reports.*

*February*, 1891.—Copies of "Notes of Errors" to all observatories.

*General.*

Various routine matters have occupied much of Messrs. Parsons and Hewitt's time.

(Signed) T. E ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

*Pouchet, G.*—Nouvelles observations sur la sardine océanique.

*Brückner, E.*– Das Klima der Eiszeit.

*Schreiber, P.*—Monatsübersicht der Ergebnisse der Beobachtungen an 12 meteorologischen Stationen im Königreiche Sachsen.

*Leyst, E.*—Ueber den Einfluss der Temperatur des Quecksilberfadens bei gewissen Maximum-Thermometern und feuchten Psychrometer-Thermometern.

*Denza, F.*—Sulle osservazioni della declinazione magnetica eseguite da Mons. Filippo Gilii alla Specola Vaticana e sulla declinazione magnetica in Roma.

—— Variazioni della temperatura a diverse altezze.

—— Piogge singolari.

—— Le stelle cadenti di Agosto e di Novembre.

*Port-au-Prince, Observatoire Météorologique.*—Die meteorologischen Beobachtungen des Prof. A. Ackermann in Port-au-Prince, Haiti, 1864–68. Von J. Hann.

—— Tägliche meteorologische Beobachtungen. 1888–89.

*Hann, J.*—Zum Klima des westlichen Pacific. Futuna, Tongatabu.

*Mauritius, Royal Alfred Observatory.*—Annual Report. 1889.

*Bremen.*—Ergebnisse der meteorologischen Beobachtungen in Bremen von 1803 bis 1890.

*Calcutta, Surveyor-General's Office.*—General report on the operations of the Survey of India Department. 1888–89.

63, *Victoria Street, May* 27, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. GALTON. |
| PROFESSOR DARWIN. | MR. STONE. |

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 6) were read and confirmed.

Mr. Scott reported (Minutes, p. 5) that he had received a letter *re* the dissemination of hay harvest forecasts by the Agricultural Office (Letter 828), and that he had subsequently had an interview with Major Craigie, Director of the Intelligence Department of that Office, and had learnt that the Board of Agriculture could not at present see how they could carry out the wishes of the Council.

Mr. Symons's letter (Minutes, May 6) was taken into further consideration, and it was resolved to ask Mr. Symons (P.C. 1002) for information on the following points:—

1. The list of stations, out of the 366, for which the returns have been published by the Council where the record has failed since 1880.
2. The list of stations proposed by him to fill the gaps in the series indicated under No. 1.
3. If the Council granted the sum of 100*l.*, what stations would Mr. Symons suggest supplying.

Mr. Scott reported that he had visited Valencia on the 22nd inst., and had inspected Westwood House. He had instructed a local builder, Mr. Galvin, to furnish estimates for a proposed addition to the house, and for the erection of the anemograph, &c. The estimates had not yet been received.

Read—Letter 932 from Mr. Sugrue, assistant at Valencia, asking the Council to make an addition to his salary, inasmuch as the proposed removal of the observatory from the island would necessitate his residing on the mainland, while his family must remain on the island.

Mr. Scott was instructed to say that the Council would be prepared to allow Mr. Sugrue an increase of 10*l.* on his annual salary (P.C. 1003).

Read—A letter from Mr. Baillie stating that since last meeting 14 logs had been received, 11 of which were "excellent."

Mr. Scott was instructed to forward the charts (O. 27) to Captain Conby, ship "Garfield," and Captain White, S.S. "Ormuz," and to convey the best thanks of the Council to the other observers.

Read—A letter (N. 2914) from Mr. S. C. Knott, Vice-Consul at Mojanga, on the west coast of Madagascar, asking for a loan of instruments, and promising to send observations.

Mr. Scott was authorised to comply with the request (P.C. 1008).

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

(1.) WARNINGS ISSUED.

*Summary.*

| | | |
|---|---|---|
| A + B (successful) - - - - | = | 7 districts. |
| C (failures) - - - - - | = | 3 districts. |

(2.) GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

Telegraphic Branch,
27th May 1891.

(Signed) FREDC. GASTER.

Submitted—The following report on the 8.30 p.m. forecasts for April 1891 :—

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

APRIL.

| Districts. | | Per-centages. Wind. | Weather | Average Forecast. | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 69 | 55 | 62 | 88 |
| " | b | 17 | 35 | 26 | |
| " | c | 11 | 3 | 7 | |
| " | d | 3 | 7 | 5 | |
| Scotland, E. | a | 48 | 65 | 57 | 81 |
| " | b | 28 | 21 | 24 | |
| " | c | 24 | 7 | 16 | |
| " | d | 0 | 7 | 3 | |
| England, N.E. | a | 59 | 59 | 59 | 85 |
| " | b | 24 | 27 | 26 | |
| " | c | 14 | 7 | 10 | |
| " | d | 3 | 7 | 5 | |
| England, E. | a | 55 | 59 | 57 | 80 |
| " | b | 21 | 24 | 23 | |
| " | c | 17 | 14 | 15 | |
| " | d | 7 | 3 | 5 | |
| Midland Counties | a | 52 | 69 | 61 | 81 |
| " | b | 27 | 14 | 20 | |
| " | c | 14 | 10 | 12 | |
| " | d | 7 | 7 | 7 | |
| England, S. | a | 48 | 59 | 54 | 83 |
| " | b | 42 | 17 | 29 | |
| " | c | 7 | 17 | 12 | |
| " | d | 3 | 7 | 5 | |
| Scotland, W. | a | 41 | 45 | 43 | 78 |
| " | b | 28 | 41 | 35 | |
| " | c | 17 | 0 | 8 | |
| " | d | 14 | 14 | 14 | |
| England, N.W. | a | 38 | 66 | 52 | 76 |
| " | b | 24 | 24 | 24 | |
| " | c | 17 | 0 | 9 | |
| " | d | 21 | 10 | 15 | |
| England, S.W. | a | 48 | 76 | 62 | 85 |
| " | b | 31 | 14 | 23 | |
| " | c | 14 | 3 | 8 | |
| " | d | 7 | 7 | 7 | |
| Ireland, N. | a | 42 | 62 | 52 | 78 |
| " | b | 31 | 21 | 26 | |
| " | c | 17 | 10 | 14 | |
| " | d | 10 | 7 | 8 | |
| Ireland, S. | a | 34 | 66 | 50 | 78 |
| " | b | 31 | 24 | 28 | |
| " | c | 14 | 0 | 7 | |
| " | d | 21 | 10 | 15 | |
| **Summary.** | | | | | |
| British Isles | a | 48 | 62 | 55 | 81 |
| " | b | 28 | 24 | 26 | |
| " | c | 15 | 6 | 11 | |
| " | d | 9 | 8 | 8 | |

Submitted—The following list of publications which had been received since the last meeting:—

*Dorpat Kaiserliche livländische gemeinnützige und ökonomische Sozietät.*—Bericht über die Ergebnisse der Beobachtungen an den Regenstationen. 1888.

*Paris, Comité International des Poids et Mesures.*—Procès-Verbaux des Séances de 1890.

*Toronto, Magnetical Observatory.*—General meteorological register for the year 1890.

*Riggenbach, A.*—Witterungs Uebersicht des Jahres 1890 nebst Mittelwerten für das Decennium 1890–91.

—— Collectanea zur Basler Witterungsgeschichte.

*Hong-Kong Observatory.*—Observations. 1889.

*London, Meteorological Office.*—Hourly means of the readings obtained from the self-recording instruments at the four Observatories under the Meteorological Council, 1887.

*Fox, W. L.*—Meteorological tables for Falmouth and the Scilly Islands for the year 1890.

*Pesth, Königl. Ung. Central-Anstalt für Meteorologie und Erdmagnetismus.*—Jahrbücher. xviii. Bd., Jahrg., 1888.

*Trinidad, Royal Botanic Gardens.*—Annual Report. 1889.

*Wollny, E.*—Untersuchungen über die Permeabilität des Bodens für Wasser.

—— Untersuchungen über das Verhalten der atmosphärischen Niederschläge zur Pflanze und zum Boden. No. 4.

*Denza, F.*—Piogge singolari.

*Stanley, Falkland Islands.*—Observations taken during the month of January 1891.

*Toronto, Meteorological Service.*—Report. 1887.

*Tebbutt, J.*—Report of Mr. Tebbutt's observatory, Windsor, N.S.W., for the year 1890.

*Upsala, Observatoire Météorologique de l'Université.*—Bulletin mensuel. Vol. xxii. 1890.

*Lang, C.*—Bericht über die Thätigkeit der kgl. bayerischen meteorologischen Centralstation. 1890.

*Lang, C., und Singer, K.*—Die Schneedecke in Bayern im Winter 1889–90.

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63, *Victoria Street, June* 17, 1891.

PRESENT:

MR. GALTON IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. STONE. |
| PROFESSOR DARWIN. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (May 27) were read and confirmed.

Read—The following letter from Mr. Symons (Minutes, p. 10):—

(M.O. 978.)

DEAR MR. SCOTT, 62, Camden Square, London, N.W., June 3, 1891.

SINCE the receipt of yours of May 28th I have had the enclosed lists got out. It is of course possible that when the tables are prepared for press there may be a few more (or less) changes, but for all practical purposes the enclosed supplies the answer to questions (1) and (2) in your letter.

As regards No. (3), I feel that it would produce so poor a result that I would rather not have my name associated with it. At 15*s.* per station 100*l.* would provide 133 records as against the 366 in the previous publication, and I think that such retrogression is undesirable.

If the total cost of 366 stations (275*l.*) could not be conveniently met out of one year's grant I am quite willing that part should stand over; but I do not wish to be associated with anything not creditable to the Council and to myself.

There is, of course, one intermediate arrangement by which a retrogression might be partly concealed—I think that it would be a pity—but it might be said, carry on all the stations which have not broken down, but do not supply the places of the absentees; this would reduce the total by about 120, and the cost from about 275*l.* to 185*l.*

Yours very truly,

R. H. Scott, Esq., M.A., F.R.S. (Signed) G. J. SYMONS.

Mr. Scott was instructed to have a map prepared showing the positions of the stations given in Mr. Symons's lists (not printed here).

The draft Report of the Council for the year 1890–91 (Minutes, p. 5) was again considered and adopted, and the Secretary was instructed to forward it to the Royal Society. (P.C. 1144.)

Mr. Scott submitted a model of a pillar suggested to be erected in Battersea Park, if approved by Mr. Dickinson (Minutes, p. 8).—Alterations were suggested, and it was resolved that the model be provisionally completed and submitted at next meeting.

Professor Darwin made a report on Mr. Dines's letter (Minutes, p. 1). He was empowered to arrange with Mr. Dines to continue his anemometrical experiments according generally to the proposal in his letters of May 4, and at a cost not exceeding 150*l.*, and to report to next Council meeting.

The Council considered the list of recipients of the publications of the Office, which was ordered to be printed.

Read—Letter (No. 970) from Mr. Sugrue, assistant at Valencia, accepting the proposal made to him (Minutes, p. 10).

Read—Letter (No. 1006) from the Secretary of the Royal Society, Edinburgh (Minutes, p. 8), as to their willingness to accept custody of the boxes of MSS. deposited by Mrs. Allan Broun. Mr. Scott stated that the boxes had been forwarded to Edinburgh.

Read—A letter stating that since last meeting 11 logs had been received, 6 of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. Warnings issued.

Summary.

| | | | | | | |
|---|---|---|---|---|---|---|
| A + B (successful) | - | - | - | - | = | 2 districts. |
| C (failures) | - | - | - | - | = | 3 districts. |

2. Gales experienced, but for which no Warnings were issued.

None.

(Signed) Fredc. Gaster.

Telegraphic Branch,
June 17, 1891.

Mr. Scott was instructed to inquire of Lloyd's as to the prospect of establishment of a station at the North Foreland (Minutes, 1890, p. 27), and as to the maintenance of the station at Malin Head (P.C. 1158), and to inquire of the Admiral Superintendent of Naval Reserves if it was proposed to maintain at Malin coastguard station any person qualified to make observations and telegraph them to London (P.C. 1152).

Submitted—The following statements of work during the month of May 1891:—

Marine Branch.

June 17, 1891.

Examined 16 new logs.

For the district between the Cape of Good Hope and New Zealand obtaining the sums of the several elements over parts of the sea where the observations from Office logs are sufficiently numerous. Also collecting additional information from the logs of H.M. ships, which have been received from the Public Record Office specially for this discussion, as well as from the logs of such men-of-war as have been received for Current work.

Charting Currents from the logs of H.M. ships. During the month 400 volumes were received from the Public Record Office.

Entering monthly gale tables on the Red Sea Charts.

Assistance given in copying the tabulated values for the Second Order Stations for the years 1881 and 1882.

(Signed) Chas. Harding.

The Marine Superintendent.

Telegraphic (Forecast and Storm Warning) Branch.
(To 31st May 1891.)

*Monthly Weather Report*, 1881.—Tables, maps, &c. for *February* and *March* well in hand. *January* done and handed in.

*Weekly Weather Report*, 1891:—All numbers issued promptly.

*Appendix I.*, Part I.—Issued. Other Appendices well in hand.

*Monthly Summary.*—Numbers for January and February written complete. March and April Tables and plates ready; awaiting decision of Council as to application of corrections to thermometric values.

*Daily Weather Report*, 1891.—All numbers issued, with monthly correction and addition sheets to April.

*Primary Checking of Storm Warnings.*—Done to date.

*Primary Checking of* 8.30 *p.m. Forecasts.*—Rather in arrears for reasons given below.

*Maps and Forecasts for Royal Naval Exhibition.*—The preparation and issue of these, twice daily, has commenced, and occupies the time of one man for at least two hours daily. They have all been promptly issued to date.

*Instructions in Meteorological Telegraphy.*—Issued.

*Annual Report*, 1891.—Proof of Appendices relating to this Branch examined and revised.

*Final Checking of Storm Warnings*, 1890.—Progressing steadily.

During this month Mr. Brodie has completed nearly the whole of his summer vacation. Several of the staff have taken small portions of theirs; and influenza has interfered with the regular work of the Room. The Whitsuntide and Queen's Birthday holidays have also been taken. The time is now commencing when, owing to the necessity for taking the summer vacations, this Branch will be sorely pressed, in order to get through even the current work, and occasional help will be needed.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

June 1, 1891.

*Hourly Means.*—The calculation of the various mean values for the year 1888 has been carried on steadily throughout the month.

*Miscellaneous.*—The gale tables for the year 1881 have been prepared. Some time spent in revising proof, &c. of Quarterly Weather Report, Part IV., 1880.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

June 1, 1891.

*Examinations.*

*April* 1891.—Completed.

Weekly examination (on receipt) of curves and documents.

*Reports, &c.*

*March* 1891.—Copies of the "*Notes of Errors*" to all observatories.

*General.*

*Diurnal Range of Rainfall*, 1880–1890:—Ruling forms and extraction of the Hourly Values proceeded with.

Various routine matters, which, with vacation and absence through sickness, accounted for much of the time of the staff.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting:—

*Chemnitz, K. Sächsisches meteorologisches Institut.*—Wetterbericht. 1887–90.

*Ballou, S. M.*—Professor Russell's theory of cold waves.

*Vienna, K.K. geographische Gesellschaft.*—Mittheilungen. 1890.

*Völcker, K.*—Untersuchungen über das Intervall zwischen der Blüthe und Fruchtreife von "Aesculus Hippocastaneum" und "Lonicera tartarica."

*Hann, J.*—Die Veränderlichkeit der Temperatur in Österreich.

*Aitken, John.*—On thermometer screens. Part iii.

—— On ocean circulation. (Two papers.)

—— On a monochromatic rainbow.

—— On the distribution of temperature under the ice in frozen lakes.

—— On the moon and the weather.

—— On the effect of oil on a stormy sea.

—— On the number of dust particles in the atmosphere of certain places in Great Britain and on the Continent, with remarks on the relation between the amount of dust and meteorological phenomena.

—— On the simple pocket dust-counter.

—— On dust, fogs, and clouds.

*Greenwich, Royal Observatory.*—Report of the Astronomer Royal to the Board of Visitors. 1891.

*Christiania, Norwegisches meteorologisches Institut.*—Jahrbuch. 1889.

*Ekholm, N.*—Étude des conditions météorologiques à l'aide de cartes synoptiques représentant la densité de l'air.

*Wigert, T.*—Trombe de Wimmerby le 4 Juillet 1890.

*Kew Observatory.*—Appendix to the Report of the Kew Committee for the year ending December 31, 1890.

*Falmouth, Royal Cornwall Polytechnic Society.*—Annual Report. 1890.
*Hammon, W. H.*—Meteorological observations taken in four balloon voyages.
*London, British Association.*—Report of the sixtieth meeting held at Leeds in September 1890.
*Sydney Observatory.*—Weather Charts. 1890, October, November.
—— Meteorological observations at Sydney. 1865 to 1877.
*Hamburg, Deutsche Seewarte.*—Katalog der Bibliothek der Deutschen Seewarte zu Hamburg.
*Rome, Specola Vaticana.*—Pubblicazioni. Fasc. I.
*Washington, Signal Office.*—Annual report. 1890.
*Odessa, Observatoire Météorologique de l'Université.*—Revue météorologique. Travaux du réseau météorologique du sud-ouest de la Russie pendant l'année 1890. Vol. I.
*Lang, C., und Singer, K.*—Die Schneedecke in Bayern im Winter 1889–90.

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63, *Victoria Street, July* 2, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | |

The Secretary was in attendance.

The Minutes of the last meeting (June 17) were read and confirmed.

Read—A letter (No. 1079) from the Board of Agriculture (Minutes, p. 11) regretting that they did not see their way to aid in the distribution of the Hay Harvest Forecasts.

Read—Letter, No. 1122, from the Admiral Superintendent of Naval Reserves, stating that it was probable that the coastguard stationed at Malin Head would be competent to make and transmit meteorological reports if required.

Read—Letter, No. 1101, from Lloyd's, stating that the station at the North Foreland was in process of construction, and that no decision had as yet been arrived at as to the abandonment of the station at Malin Head. (Minutes, p. 1)

Read—Letter 1147 from Mr. Whipple, asking permission to recharge the battery of the electrograph, which had run down.

Mr. Scott was instructed to prepare a memorandum by next meeting showing what had already been done with the electrograms at Kew and Greenwich.

Read—Letter 508 from Mr. Whipple, with an estimate from Messrs. Beck for new cameras for cloud photography (Minutes, 1888, p. 127). It was decided that new lenses were not wanted, and new cameras not at present; that as systematic observations as practicable should be made during the present summer with the existing cameras, and results reported to Council (P.C. 1235).

Read—A letter (No. 1150) from Mr. Dines (Minutes, p. 1), stating that probably his own house at Oxshott might be a suitable locality for the proposed anemometrical experiments.

Mr. Scott was instructed to inform him that if he is satisfied that his own place is sufficient to obtain satisfactory results, he may proceed with the experiments and draw on the Office to the extent of 50*l.* (P.C. 1242).

Reported (Minutes, p. 1)—That it had been found at Kew that the rain-gauge records might be obtained on ordinary paper by the use of aniline ink and a pen. (Letter 1172.)

Read—A letter stating that since last meeting eight logs had been received, seven of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Submitted—The following report on the 8.30 p.m. forecasts for May 1891 :—

The letters used have the following signification :—
**a**=complete success. | **c**=partial failure.
**b**=partial (*i.e.*, more than half) success. | **d**=total failure.

| Districts. | | Per-centages. | | | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| | | Wind. | Weather. | Average Forecast. | |
| Scotland, N. | a | 58 | 55 | 57 | 92 |
| ,, | b | 39 | 32 | 35 | |
| ,, | c | 0 | 7 | 4 | |
| ,, | d | 3 | 6 | 4 | |
| Scotland, E. | a | 58 | 62 | 60 | 86 |
| ,, | b | 20 | 32 | 26 | |
| ,, | c | 19 | 3 | 11 | |
| ,, | d | 3 | 3 | 3 | |
| England, N.E. | a | 32 | 65 | 49 | 73 |
| ,, | b | 32 | 16 | 24 | |
| ,, | c | 36 | 13 | 24 | |
| ,, | d | 0 | 6 | 3 | |
| England, E. | a | 35 | 52 | 44 | 76 |
| ,, | b | 32 | 32 | 32 | |
| ,, | c | 23 | 3 | 13 | |
| ,, | d | 10 | 13 | 11 | |
| Midland Counties | a | 39 | 52 | 46 | 70 |
| ,, | b | 19 | 29 | 24 | |
| ,, | c | 23 | 6 | 14 | |
| ,, | d | 19 | 13 | 16 | |
| England, S. | a | 32 | 55 | 44 | 79 |
| ,, | b | 45 | 26 | 35 | |
| ,, | c | 7 | 3 | 5 | |
| ,, | d | 16 | 16 | 16 | |
| Scotland, W. | a | 45 | 32 | 39 | 77 |
| ,, | b | 35 | 42 | 38 | |
| ,, | c | 10 | 16 | 13 | |
| ,, | d | 10 | 10 | 10 | |
| England, N.W. | a | 45 | 52 | 49 | 73 |
| ,, | b | 29 | 19 | 24 | |
| ,, | c | 16 | 23 | 19 | |
| ,, | d | 10 | 6 | 8 | |
| England, S.W. | a | 52 | 65 | 59 | 90 |
| ,, | b | 36 | 26 | 31 | |
| ,, | c | 6 | 6 | 6 | |
| ,, | d | 6 | 3 | 4 | |
| Ireland, N. | a | 45 | 71 | 58 | 89 |
| ,, | b | 39 | 23 | 31 | |
| ,, | c | 6 | 6 | 6 | |
| ,, | d | 10 | 0 | 5 | |
| Ireland, S. | a | 45 | 55 | 50 | 87 |
| ,, | b | 45 | 29 | 37 | |
| ,, | c | 3 | 6 | 5 | |
| ,, | d | 7 | 10 | 8 | |
| Summary. | | | | | |
| British Isles | a | 44 | 56 | 50 | 81 |
| ,, | b | 34 | 28 | 31 | |
| ,, | c | 13 | 8 | 11 | |
| ,, | d | 9 | 8 | 8 | |

**The specimen model of a pillar for the exhibition of instruments in the Parks (Minutes, p. 12) was submitted. Mr. Scott was instructed to submit the model to Mr. Dickinson for the County Council.**

**Submitted—The following statements of work during the month of June 1891 :—**

MARINE BRANCH.

July 1, 1891.

Examined 19 new logs.

Extracting meteorological observations from the logs of Her Majesty's ships which have visited the district between the Cape of Good Hope and New Zealand.

Charting currents in all oceans from the logs of Her Majesty's ships. In the course of the month 400 volumes were received from the Public Record Office for this work.

Commenced drafting remarks on the principal features exhibited in the Winds, Currents, Pressure, and Temperatures over the area covered by the Red Sea Charts. Gale tables have been entered on all the charts.

Preparing the introductory notes for the Aden cyclone publication, a proof of which has been received. Also preparing a list of the ships from which data were received for that discussion, to be published as an addendum.

(Signed) CHAS. HARDING.

The Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 30th June 1891.)

July 2, 1891.

*Monthly Weather Report*, 1881.—Tables and maps for first quarter, all but completed.

*Weekly Weather Report*, 1891.—All numbers issued promptly to date. Various appendices well in hand.

*Monthly Summary.*—Still up to date, as far as possible, but awaiting decision of Council as to correction of temperature values.

*Daily Weather Report*, 1891.—All numbers issued promptly to date, with monthly correction sheet for *May*.

*Primary Checking of Storm Warnings*, 1891.—Done to date.

*Primary Checking of* 8.30 *p.m. Forecasts.*—Return for May handed in; that for June well in hand.

*Final Checking of Storm Warnings*, 1891.—All but completed.

*Hay Harvest Forecasts*, 1891.—System organised, and issue commenced.

*Maps, and Forecasts for Royal Naval Exhibition.*—Still being issued.

*Tables and Maps of Sunshine in British Islands*, 1881–90.—Considerable time has been spent in experimenting with these.

*Plotting of Rainfall Stations* in connexion with Mr. Symons' proposals.—In hand.

During this month the Whitsuntide and Queen's Birthday holidays have been taken, and some advance has been made with the summer vacations; thus—

*Mr. Francis* has taken one week.

*Mr. Gaster* has taken four days.

In addition to this Mr. Gaster has attended in the Chancery Division (Royal Courts of Justice) on three days in case of Douglas *v.* Gerald, and has been absent on two days on account of death of his father.

The period for vacation in this Branch has now fairly commenced, and very little beyond the regular routine work is likely to be done until October.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

July 1, 1891.

*Hourly Means.*

The calculation of the mean hourly and other values for 1888 is nearly completed, and a portion of the work has already gone to the printer. The whole of the tables will be completed during July.

*Miscellaneous.*

Some work has been done in connexion with the Quarterly Weather Report, 1880, the Annual Report of the Office, and the Sunshine Returns for the past ten years.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

July 1, 1891.

*Examinations.*

*May* 1891.—Completed.
Weekly examination (on receipt) of curves and documents.

*Reports.*

*April* 1891.—Copies of "Notes of Errors" to all observatories.

*General.*

*Diurnal Range of Rainfall*, 1880–1890.—Ruling forms and extraction of the Hourly Values proceeded with.
Various routine matters accounted for much of the time of the staff.

(Signed) T. E. ALLEN.

Submitted—The following summary as the result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

SUMMARY.

| | | |
|---|---|---|
| A + B (successful) - - - | = | 5 districts. |
| C (failures) - - - - | = | 9 districts. |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
2nd July, 1891.

Submitted—The following list of publications which had been received since the last meeting :—

*Wild, H.*—Über den Einfluss der Aufstellung auf die Angaben der Thermometer zur Bestimmung der Lufttemperatur.
*Raulin, V.*—Sur les observations pluviométriques de M. H. Carlier à Saint-Martin-de-Hinx (Landes).
*Todd, C.*—The past summer. (1890–91.) (Newspaper cutting.)
*Abbe, C.*—An account of the progress in meteorology in the years 1879–81, 1882, 1883.
—— —— An account of recent progress in dynamic meteorology.
—— —— A plea for terrestrial physics.
—— —— William Babcock Hazen.
—— —— Sketch of James Pollard Espy.
—— —— The Signal Service bibliography of meteorology.
—— —— Notice of St. Helena.
*York, Yorkshire Philosophical Society.*—Annual report. 1890.
*Emden, Naturforschende Gesellschaft.*—Jahresbericht. 1889–90.
*Buenos Ayres, Oficina Meteorológica Argentina.*—Anales. Tomo viii.
*Dove, K.*—Studien über Ostafrika. 2 Papers.
*Trinidad Royal Botanic Gardens.*—Meteorological results for 1890.
*Paulsen, A. F. W.*—Aurores boréales observées à Godthaab.
*McAdie, A.*—Mean temperatures and their corrections in the United States.

63, *Victoria Street, July* 15, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (July 2) were read and confirmed.

Read—The following letter (Minutes, p. 5) :—

R. 6125.
(M.O. 1237.)

Board of Trade (Railway Department),
London, S W., July 11, 1891.

SIR,

I AM directed by the Board of Trade to transmit to you herewith, the Memorandum and Articles of Association of the Meteorological Council as settled by this Board's counsel, and to request that they may now be furnished with three prints on each side of foolscap-sized paper and unsigned of the Memorandum and Articles as amended.

The type should be kept standing until the licence is granted to admit of any further revision that may be required in the Memorandum and Articles.

I am, &c.
(Signed) GEORGE J. SWANSTON.

Robert H. Scott, Esq.,
Meteorological Office, 63, Victoria Street, S.W.

As it appeared from the alterations made by Counsel in the Memorandum and Articles of Association that seven names were requisite to constitute the "Association," it was resolved that the Secretary should be included among the Members of the Association who should apply for registration.

The Secretary was instructed to have the papers, as amended, printed and forwarded to the Board of Trade, with an explanatory letter (P.C. 1413).

11 Mr. Scott submitted estimates for the alterations proposed at Westwood House (Letter 949, Minutes, p. 10), and reported that he had recently learned from Messrs. Few that the arrangements for transfer of the lease from Miss Needham's executors were nearly completed.

It was resolved that the Secretary, on his approaching visit to Valencia, be authorised to settle the details of the arrangements and to make contracts for work not exceeding 200*l*. The general plan to be adopted is that described by the builder as the tower arrangement (Estimate No. 4, in Letter 949), which provides for a room over that to be built for the self-recording instruments, and the erection of the anemometer over the new upper room, and not over the old building.

13 Reported—That the maps showing the proposed changes in Mr. Symons' list of rainfall stations had been prepared (Minutes, p. 12), and forwarded to Mr. Buchan. It was resolved that the matter be considered after the vacation.

14 The printed lists of recipients of publications was submitted (Minutes, p. 12). It was referred to the Chairman for consideration.

16 Mr. Scott submitted a Memorandum (M.O. 1278), on the condition, &c., of the Kew electrograms (Minutes, p. 15). It was resolved that the record at Kew be continued as at present carried out, and that no fresh expenditure be authorised until a report on the working of this instrument has been considered by the Council. It was also resolved that Professor Boys be requested to undertake the preparation of such a report, the Secretary having mentioned that he might be willing to do so.

Reported—That since last meeting five logs had been received, four of them being "excellent."

Mr. Scott was instructed to convey the best thanks of the Council to the observers.

Read—Letter 1220, from the Royal Meteorological Society, asking for a grant of 25*l*. towards the cost of inspection of their stations, as usual (Minutes, 1890, p. 26).—Approved (P.C. 1352).

Submitted—The following report on the 8.30 p.m. forecasts for June 1891 :—

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

JUNE.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 64 | 70 | 67 | 87 |
| ,, | b | 20 | 20 | 20 | |
| ,, | c | 13 | 7 | 10 | |
| ,, | d | 3 | 3 | 3 | |
| Scotland, E. | a | 73 | 67 | 70 | 87 |
| ,, | b | 17 | 17 | 17 | |
| ,, | c | 7 | 16 | 12 | |
| ,, | d | 3 | 0 | 1 | |
| England, N.E. | a | 50 | 50 | 50 | 80 |
| ,, | b | 30 | 30 | 13 | |
| ,, | c | 17 | 10 | 14 | |
| ,, | d | 3 | 10 | 6 | |
| England, E. | a | 43 | 47 | 45 | 79 |
| ,, | b | 40 | 27 | 34 | |
| ,, | c | 10 | 10 | 10 | |
| ,, | d | 7 | 16 | 11 | |
| Midland Counties | a | 53 | 50 | 52 | 79 |
| ,, | b | 27 | 27 | 27 | |
| ,, | c | 17 | 17 | 17 | |
| ,, | d | 3 | 6 | 4 | |
| England, S. | a | 44 | 57 | 51 | 79 |
| ,, | b | 33 | 23 | 28 | |
| ,, | c | 23 | 13 | 18 | |
| ,, | d | 0 | 7 | 3 | |
| Scotland, W. | a | 47 | 60 | 54 | 80 |
| ,, | b | 33 | 20 | 26 | |
| ,, | c | 17 | 3 | 10 | |
| ,, | d | 3 | 17 | 10 | |
| England, N.W. | a | 47 | 64 | 56 | 77 |
| ,, | b | 33 | 10 | 21 | |
| ,, | c | 13 | 13 | 13 | |
| ,, | d | 7 | 13 | 10 | |
| England, S.W. | a | 50 | 60 | 55 | 84 |
| ,, | b | 30 | 27 | 29 | |
| ,, | c | 13 | 0 | 6 | |
| ,, | d | 7 | 13 | 10 | |
| Ireland, N. | a | 47 | 74 | 61 | 82 |
| ,, | b | 30 | 13 | 21 | |
| ,, | c | 13 | 10 | 12 | |
| ,, | d | 10 | 3 | 6 | |
| Ireland, S. | a | 50 | 53 | 52 | 77 |
| ,, | b | 20 | 30 | 25 | |
| ,, | c | 20 | 7 | 13 | |
| ,, | d | 10 | 10 | 10 | |
| SUMMARY. | | | | | |
| British Isles | a | 52 | 59 | 56 | 81 |
| ,, | b | 28 | 22 | 25 | |
| ,, | c | 15 | 10 | 12 | |
| ,, | d | 5 | 9 | 7 | |

**Submitted—The following statement of accounts for the quarter ending 30th June 1891:—**

| Income. | £ s. d. | £ s. d. | Expenditure. | £ s. d. | £ s. d. |
|---|---|---|---|---|---|
| Balance from year 1890–91 | - - - | 2,627 17 2 | Administration: | | |
| Proportion of vote for quarter - - - | - - - | 3,825 0 0 | Payment of Council - | 250 0 0 | |
| Repayment of expenses charged under— | | | Secretary - - | 200 0 0 | |
| (1.) Incidental expenses | 9 8 11 | | Salaries and wages - | 198 6 6 | |
| (2.) Observatories, &c. | 7 2 8 | | Rent, fuel, and lighting | 166 12 2 | |
| | | 16 11 7 | Furniture and fittings | *19 5 3 | |
| Supply of Weather Information: | | | Incidental and contingent expenses - | 89 5 10 | |
| D.W. Charts and Forecasts - - | 53 5 6 | | Expenses incidental to International Meteorological Congress | 1 8 0 | |
| 6 p.m. Charts - - | 6 5 0 | | Pensions - - | 46 14 1 | |
| Information for Press Agencies, &c. - | 29 8 0 | | | | 971 11 10 |
| Telegrams - - | 30 19 6 | | Special Researches - | - - - | 240 9 10 |
| | | 119 18 0 | Land Meteorology: | | |
| Sale of Instruments, &c.: | | | Observatories and stations - - | 700 16 10 | |
| M.O. account - - | 30 0 6 | | Discussion and reduction of observations - | 317 16 0 | |
| Royal Navy account - | 19 11 0 | | | | 1,018 12 10 |
| Mercantile Marine account - - | 26 10 0 | | Weather Information and Forecasts: | | |
| | | 76 1 6 | Telegraphic reports and storm warnings | 560 9 0 | |
| Commission charged on work done for Colonies, &c. - - | - - - | 9 0 2 | Preparation and issue of reports and forecasts - - | 456 12 6 | |
| | | | | | 1,017 1 6 |
| | | | Inspections: | | |
| | | | Salaries and travelling | - - - | 75 0 0 |
| | | | Ocean Meteorology: | | |
| | | | Discussion and reduction of observations - | 417 13 0 | |
| | | | Expenses incidental to the supply of instruments: | | |
| | | | Proportion for care and issue of instruments - | 50 0 0 | |
| | | | Royal Navy - | 93 2 7 | |
| | | | Mercantile Marine | 38 9 11 | |
| | | | Distant island and coast stations - | 2 16 3 | |
| | | | | | 602 1 9 |
| | | | Balance - - | - - - | 2,749 10 8 |
| | | £6,674 8 5 | | | £6,674 8 5 |

| Liabilities. | £ s. d. | Assets. | £ s. d. |
|---|---|---|---|
| To Council - - - - | 250 0 0 | By cash at Bank - - - | 3,035 17 0 |
| „ outstanding accounts or work uncompleted - - - - | 240 11 8 | „ „ at Office - - - | 76 10 10 |
| „ Post Office (estimated) - - | 260 0 0 | „ H.M. Exchequer - - - | 325 0 0 |
| „ sundry creditors - - - | 227 1 8 | „ sundry debtors - - - | 289 16 2 |
| „ balance - - - - | 2,749 10 8 | | |
| | £3,727 4 0 | | £3,727 4 0 |

* Some expenses under this head not yet brought to account.

Reported—That the cash accounts for the six months ended the 31st March, 1891, had been audited by the Chairman and Professor Darwin, and would forthwith be sent to the Treasury for the Audit Office. The receipts for the six months amounted to 8,863*l.* 1*s.* 0*d.* The payments amounted to 9,389*l.* 19*s.* 1*d.* leaving a balance of 3,101*l.* 1*s.* 2*d.* in hand and at the bank on the 1st April 1891, as against 3,416*l.* 6*s.* 8*d.* on the 1st April 1890.

Reported—That the following instruments had been ordered to replenish stock :—

| | £ | *s.* | *d.* |
|---|---|---|---|
| 12 maximum thermometers - - - cost | 12 | 0 | 0 |
| 12 minimum ,, - - - ,, | 12 | 0 | 0 |

(Signed) R. STRACHAN.

—Approved.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

None.

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
July 15, 1891.

Submitted—The following

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1890.

| COASTS. | Total Number of Orders to Hoist and Repetitions. | Warnings justified by subsequent Gales. Force 8 and upwards. | Warnings justified by subsequent strong Winds. Forces 6 and 7. | Warnings not justified by subsequent weather. | Warnings late. Force 9 reached at two Stations before issue. | Warnings partially late. Force 9 reached at one Station before issue. | Warnings in error owing to Telegraphic Mistakes. | STORMS FOR WHICH NO WARNING WAS ISSUED. |
|---|---|---|---|---|---|---|---|---|
| SCOTLAND, N.E. - - | 40 | 32 | 6 | 2 | — | — | — | Mar. 12,* Apl. 8, June 25. |
| Do. E. - - | 32 | 17 | 11 | 3 | — | 1 | — | |
| Do. N.W. - - | 44 | 26 | 13 | 2 | 1 | 2 | — | June 25. |
| Do. W. - - | 45 | 24 | 13 | 7 | — | 1 | — | |
| IRELAND, S.W. - - | 53 | 34 | 8 | 8 | 1 | 2 | — | Nov. 14. |
| Do. N.W. - - | 49 | 32 | 10 | 2 | 3 | 2 | — | Jan. 14, Mar. 12, Mar. 24, Apl. 9, Nov. 4, Dec. 31. |
| IRISH SEA - - | 46 | 34 | 4 | 4 | — | 4 | — | Jan. 7, Apl. 8, Nov. 14, Dec. 30. |
| ST. GEORGE'S CHANNEL - | 40 | 21 | 13 | 6 | — | — | — | |
| BRISTOL CHANNEL - | 39 | 23 | 14 | 1 | — | 1 | — | Dec. 30. |
| ENGLAND, S.W. - - | 35 | 21 | 12 | 1 | — | 1 | — | Jan. 17. |
| Do. S. - - | 26 | 15 | 9 | 2 | — | — | — | |
| Do. S.E. - - | 23 | 12 | 9 | 2 | — | — | — | |
| Do. E. - - | 24 | 11 | 9 | 3 | 1 | — | — | |
| Do. N.E. - - | 29 | 18 | 3 | 6 | 1 | 1 | — | Jan. 9, Mar. 12, Apl. 8. |
| TOTALS - - | 525 | 320 | 134 | 49 | 7 | 15 | — | |
| PER-CENTAGES - | — | 61·0 | 25·5 | 9·3 | 1·3 | 2·9 | — | |

* This gale was confined to the extreme northern part of the district.

Submitted—The following list of publications which had been received since the last meeting :—

*Foerster, W.*—Die Erforschung der obersten Schichten der Atmosphäre.

*Harding, C.*—The great frost of 1890–91.

*Weihrauch, K.*—Meteorologische Beobachtungen angestellt in Dorpat in den Jahren 1881–1885.

*Washington, Smithsonian Institution.*—Annual report. 1889.

*Carlsruhe, Centralbureau für Meteorologie und Hydrographie.*—Die Ergebnisse der meteorologische Beobachtungen im Jahre 1890.

*Aguilar Santillan, R.*—Bibliografía meteorológica Mexicana correspondiente al año de 1890.

*Stonyhurst College Observatory.*—Results of meteorological and magnetical observations, 1889–90.
*Shortland, P. F.*—Temperature of the sea at various depths between Bombay and Aden.
*Avignon, Commission Météorologique du Département de Vaucluse.*—Compte rendu pour l'année 1890.
*Singer, K.*—Die Witterung in Suddeutschland 1861–1890.
*Lang, C.*—Säculare Schwankungen der Blitz und Hagelgefahr.
*Steen, A. S.*—Die Aenderungen des Luftdruckes während einer totalen Sonnenfinsterniss.
*Sydney Observatory.*—Weather Maps, July 1880 to March 1888.

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63, *Victoria Street, October* 28, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. GALTON. |
| PROFESSOR DARWIN. | MR. STONE. |

The Secretary was in attendance.

The Minutes of the last meeting (July 15) were read and confirmed.

Reported—That the Memorandum and Articles of Association of the Council (Minutes, July 15) had been received from the Board of Trade, September 26 (Letter 1711), and had been registered on the 8th of October.

It was resolved that the first general meeting of the Association should be held on the 18th proximo, and that subsequently the general meeting in each year be held on the first meeting of the Council in November.

Reported—That a delay had arisen with regard to the completion of the purchase of Westwood House (Minutes, July 15), owing to the fact that certain mortgages had been effected on the property, and that it had not been proved that these mortgages had been paid off.

Mr. Scott reported that on the 24th of July he had had a visit from a gentleman from the County Council relative to the proposed frame for exhibiting instruments in
18 the parks (Letter 1306) (Minutes, p. [illegible]), and that the model frame had been removed by the County Council from the Office, so that the Meteorological Council had no further responsibility in the matter.

Mr. Scott reported that he had attended the International Meteorological Conference at Munich (August 24–September 2), and he asked permission to print the English translation of the proceedings as on former occasions, and also to print a classified analysis, in three languages, of the resolutions of all the International Congresses, &c. which have been held.—Approved.

Read—Letter 1553 from the Coastguard Office, Admiralty, suggesting that as some difficulty had arisen at Mullaghmore as to the transmission of Admiralty messages through the telephone belonging to the Meteorological Office (P.C. 280, 1885), it might be well to remove the telephone from Mr. Kerr's house to the coastguard station.

Mr. Scott was instructed to inquire as to the number of Admiralty messages passing along the telephone wire (P.C. 1962).

Mr. Buchan made a verbal report on the proposed changes in Mr. Symons' list of rainfall stations (Minutes, July 15). Mr. Scott was instructed to prepare a map showing the positions of all the stations for which data published for 1866–80 could be continued for the years 1881–90.

Submitted—The following Reports of Inspections :—

REPORT of INSPECTION of the SCOTTISH STATIONS for 1891.

The mercurial Standard Barometer No. 690 was used on this year's tour of inspection of stations. It was compared before and after inspection with a standard in Edinburgh, which shows that no change had occurred during inspection. The barometers were found to be in good order, and the observations made with satisfactory care and accuracy. The following Table gives the results of the comparisons of the station barometers with the Standard Barometer No. 690.

TABLE I.

| STATIONS. | Inspector's Standard corrected. | Not Corrected. | | REMARKS. |
|---|---|---|---|---|
| | | Reporting Barometer. | Check Barometer. | |
| | Inches. | Inches. | Inches. | |
| Ochtertyre | 29·678 | 29·664 | — | |
| Laudale | — | 29·756 | 29·740 | Check barometer in flat above. |
| Fort William | 29·999 | 29·994 | — | |
| Callton Mor | 29·935 | 29·900 | — | |
| Rothesay | 29·953 | 29·956 | — | |
| Ardrossan | 29·980 | 29·972 | — | |
| Pinmore | 29·726 | 29·730 | — | |
| Glenlee | 29·690 | 29·690 | — | |
| Cargen | 29·820 | 29·760 | — | See Inspection Notes. |
| Stornoway | 29·077 | 29·070 | 29·068 | |
| Nairn | 29·149 | 29·144 | 29·146 | |
| Fort Augustus | 29·393 | 29·385 | — | |
| Lairg | 29·577 | 29·560 | — | |
| Dunrobin | 29·973 | 29·976 | — | |
| Wick | 29·250 | 29·244 | 29·198 | Check barometer in higher situation in house. |
| Deerness | 29·158 | 29·168 | — | |
| Dunrossness | 29·772 | 29·763 | 29·772 | |
| Aberdeen | 30·057 | 30·060 | 30·057 | |
| Braemar | 28·770 | 28·754 | — | |
| Dundee | 29·920 | 29·910 | — | |
| Hawick | 29·054 | 29·056 | — | |
| Wolfelee | 29·163 | 29·164 | — | |
| Marchmont | 29·520 | 29·520 | — | |
| Glasgow | 29·102 | 29·102 | — | |
| Clober | 28·766 | 28·748 | — | |
| Edinburgh | 28·996 | 28·960 | — | |
| Leith | 29·293 | 29·294 | 29·294 | |

The various thermometers in use at the stations were compared with Standard Thermometer No. 4433. The results of the comparisons are detailed in the following Table, which gives the corrected readings of the standard thermometer, the errors of each instrument, and the conditions under which the comparisons were made.

TABLE II.

| STATIONS. | Standard No. 4433, corrected. | Dry Bulb. | Wet Bulb. | Spare Thermometer. | Max. Thermometer. | Min. Thermometer. | Time in Water, in Minutes. | Change of Temperature. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|
| | ° | ° | ° | ° | ° | ° | | | |
| Ochtertyre | 60·2 | ·0 | ·0 | — | +0·1 | ·0 | 65 | Uniform. | |
| Laudale | 59·4 | +0·2 | +0·2 | — | +0·1 | +0·3 | 120 | +0·3 | |
| Fort William | 60·0 | +0·2 | +0·2 | — | 0·0 | −0·1 | 150 | +0·6 | |
| Callton Mor | 59·6 | +0·1 | 0·0 | — | +0·8 | −0·5 | 60 | −0·3 | |
| Rothesay | 59·8 | 0·0 | 0·0 | — | +0·2 | −0·4 | 75 | +0·4 | |
| Ardrossan | 60·0 | +0·2 | +0·3 | — | −0·3 | −0·2 | 95 | +0·2 | |
| Pinmore | 58·3 | +0·3 | +0·5 | — | −0·1 | +0·1 | 90 | +0·3 | |
| Glenlee | 61·0 | +0·3 | +0·2 | — | −0·3 | 0·0 | 60 | Uniform. | |
| Cargen | 66·2 | +0·4 | +0·4 | — | 0·0 | −0·2 | 70 | +0·5 | |
| Stornoway | 57·9 | +0·5 | +0·5 | — | −0·4 | −0·5 | 180 | +0·4 | |
| Nairn | 58·3 | +0·7 | +0·7 | — | 0·0 | −0·1 | 60 | Uniform. | |
| Fort Augustus | 55·8 | 0·0 | 0·0 | — | +0·1 | −0·4 | 120 | Do. | |
| Lairg | 54·8 | +0·2 | +0·1 | — | +0·1 | +0·1 | 60 | Do. | |
| Dunrobin | 55·8 | −0·6 | −0·6 | — | 0·0 | −0·4 | 90 | Do. | |
| Wick | 55·6 | +0·5 | +0·4 | — | −0·4 | −0·1 | 45 | Do. | |
| Deerness | 56·2 | 0·0 | 0·0 | 56·9 | +0·2 | 0·0 | 120 | +0·5 | |
| Dunrossness | 57·4 | +0·4 | +0·5 | — | +0·1 | 0·0 | 165 | −0·5 | |
| Aberdeen | 56·2 | +0·3 | +0·3 | — | +0·3 | +0·2 | 100 | Uniform. | |
| Braemar | 56·1 | +0·4 | +0·5 | — | −0·1 | −0·2 | 110 | +0·3 | |
| Dundee | 54·4 | +0·4 | +0·4 | — | +1·4 | −0·4 | 50 | Uniform. | |
| Hawick | 59·9 | 0·0 | 0·0 | — | −0·1 | +0·1 | 150 | Do. | |
| Wolfelee | 53·2 | −0·2 | −0·3 | — | +0·2 | −1·0 | 120 | +0·2 | |
| Marchmont | 52·7 | −0·1 | −0·2 | — | 0·0 | 0·0 | 180 | Uniform. | |
| Glasgow | 47·9 | — | — | — | −0·1 | 0·0 | 75 | Do. | |
| Clober | 48·3 | +0·9 | +0·9 | — | +0·4 | −0·2 | 180 | −0·6 | |
| Edinburgh | 51·2 | 0·0 | +0·1 | — | 0·0 | 0·0 | 105 | +0·2 | |
| Leith | 50·2 | +0·1 | +0·3 | — | +0·1 | −0·4 | 60 | Uniform. | |

The only cases of the minimum thermometer being out of order occurred at Wick and Dunrossness, which are described in the following notes.

*Hygrometers.*—The observations of the dry and wet bulbs made immediately on opening the Stevenson Screen at all the stations show that the hygrometers are very well attended to. The smallest difference—Dry 61°·8, Wet 61°·5—was noted at Pinmore, immediately after exceedingly heavy rain when the air and all objects near were drenching wet.

## Notes on the Stations.

*Ochtertyre,* July 31st, 1891.—The instruments are all in excellent order and the observations accurately and intelligently made.

*Laudale,* August 4th.—The instruments are in excellent order and are observed with care and accuracy.

*Fort William,* August 5th.—The instruments are in admirable order; the observations are punctually and correctly made.

*Poltalloch,* August 6th.—The instruments are well attended to and the observations are made with much care and intelligence.

*Rothesay,* August 7th.—The instruments are in thoroughly good order. Mr. Kay was from home at the time of my visit, and during his absence the observations are made by Mrs. and Miss Kay.

*Ardrossan,* August 7th–8th.—The instruments are in very good order and the observations are made with considerable intelligence, and a good deal of interest appears to be taken in them. I gave instruction to resume at once the 10 p.m. or late daily observation.

*Pinmore,* August 8th.—The condition in which the instruments are and the care and correctness shown in making the observations are all that can be desired. The vane on Pinmore House, which is kept in good order, is used along with smoke, trees, &c. in making the observations of wind.

*Glenlee,* August 10th.—The instruments are in remarkably good order and the observations are made conscientiously and with much care.

*Cargen,* August 11th.—The instruments are in good order and the observations are made with great care and intelligence. Mr. Dudgeon personally gives much attention to the instruments, the observations, and the schedules. Shortly before my visit the barometer had been accidentally broken; but in the meantime, till the new one arrived from Edinburgh, the one in the hall, which of its kind is a good one with error of −0·060 inch, is used.

*Stornoway,* August 25th.—The thermometer screen with enclosing railing were ordered to be repaired, otherwise the instruments are in remarkably good order and the observations are evidently made with conscientiousness and care. I specially drew Mr. Forbes and assistants' attention to the observations of wind direction, and recommended that the reading, after entry in the book, be compared with the observation.

*Nairn,* August 26th.—Some slight repairs are ordered for the thermometer screen, but with this exception the instruments are in very good order and the observations are made with care. The reductions of the barometer for the previous three months were scrutinized, and one error was discovered, the reading of July 28th at 8 a.m. should have been 29·653 and not 29·613 as had been wired.

*Fort Augustus,* August 28th.—The instruments are all in excellent order and the observations are made with much intelligence and with the greatest care. The Rev. Adrian Weld Blundell became observer after the death of Father Cody. It is proposed to add observations of ozone and underground temperature, and possibly also observations of electricity.

*Lairg,* August 29th.—Shortly after last inspection a new rain gauge was got and placed in a good situation. The instruments are all in good order. During the absence of Mr. Young the barometer was in the house of Sergeant Instructor Rae, of the volunteers, who was for the time acting as observer.

*Dunrobin,* August 29th.—As the scales of the dry and wet bulb thermometers have become indistinct a new hygrometer has been recommended, otherwise the instruments were in good order and the observations continue to be very carefully observed.

*Wick,* August 31st.—An air-bubble about 0°·5 was in spirit column, which Mr. Sinclair was aware of, but thought it due to the instrument being a defective one. It was put right. A new stand for the Stevenson screen was ordered and the whole to be painted. The check barometer, which had recently been repaired, was in good order, as were also the other instruments, with the above exceptions. The observations are carefully and very fully and intelligently made.

*Deerness,* September 2nd.—The instruments were removed from Stennis to Deerness three months ago. They have been remarkably well placed in their new positions, the positions obtained for the anemometer and sunshine recorder being singularly good. All are in good order and the observations are made with great care and intelligence.

*Dunrossness,* September 4th.—Orders were given to repaint the Stevenson screen and posts. A small portion of spirit was lodged at the top of the tube of the minimum thermometer, which is so constructed that the observer could not have been expected to have detected it. It was put right with Mr. Brand's assistance. It is probable that the error commenced with the use of the instrument a year since, and that the error has been about a degree throughout. An excellent position for a sunshine recorder in front of the manse was selected, and directions given as to the placing of

it. Otherwise the instruments are in excellent order and the observations are punctually and intelligently made.

*Aberdeen*, September 8th.—Everything at this station is in excellent order and the observations are made with much intelligence.

*Braemar*, August 7th.—All the instruments are in admirable order and the observations are carefully and accurately recorded.

*Dundee*, September 8th.—The instruments continue to be well attended to and the observations are made with care and accuracy.

*Hawick*, October 1st.—The instruments are all in remarkably good order and the observations are made with much interest and intelligence. It is intended to add to the monthly sheet observations of wind, cloud, and weather. The observations of wind, however, cannot, owing to the deep confined valley of the Teviot here, be accepted as representing the general directions of the wind in this part of Scotland

*Wolfelee*, October 2nd.—The instruments are well attended to and the observations are made with intelligence and conscientiousness.

*Marchmont*, October 3rd.—The instruments are particularly clean and well attended to and the observations are made with great fulness and intelligence.

*Glasgow*, October 15th.—The instruments continue to be kept in very good order, and the observations are accurately made.

*Clober, Milngavie*, October 16th.—Since last year's inspection considerable changes have been made. The shed originally designed for the thermometers has been removed and a Stevenson screen placed on the same site. The rain gauge has been removed from this site and placed in the open field near the anemometer. Experiments are being made with an anemometer sent by Mr. Bryson, of Edinburgh, with regard to the registration of the direction of the wind. The instruments, and their exposures, are now uniform with those at the Council's other stations; they are all in very good order, and Mr. Bertram makes the observations with much enthusiasm and intelligence.

*Edinburgh*, October 19th.—Since last inspection a new Stevenson screen has taken the place of the one previously used which was a modified Stevenson. There is also a storm rain gauge and a duplicate set of the other instruments at this station. The instruments are all in very good order and the observations are made with care and accuracy.

*Leith*, October 20th.—The instruments are in good order and the observations are carefully and correctly made. Mr. T. Richardson, the new assistant, observes and makes up the daily weather report correctly.

*The Observations.*—The comparison of their barometers with the standard has been already given in first Table of this Report. In each case the maximum and minimum thermometers in the special screens of the observatories were compared with the standard with this result:—

| — | Standard No. 4433. | Max. Temp. | Min. Temp. |
|---|---|---|---|
| Fort William - - | 60°·0 | 60°·0 | 59°·7 |
| Aberdeen - - - | 56·2 | 56·1 | 56·1 |
| Glasgow - - - | 47·9 | 47·8 | 47·9 |

At Fort William the registering rain-gauge, which had not been acting satisfactorily, is now in good order.

The instruments, registrations, and observations at each of these observatories are very satisfactory.

## Report on Inspection of Observatories by G. M. Whipple.

### I.—Self-recording Observatories.

*Falmouth Observatory.*—Visited August 8th to 14th, 1891.

The self-recording meteorological instruments were examined, and all the clocks and lenses cleaned as usual. I found all parts carefully kept and in excellent order.

The anemograph bearings were found well lubricated, the asbestoline applied last year, with the exception of the top velocity bearing, which had run dry, having proved a first-rate lubricant.

The rain-gauge pencil was examined and found to be an ordinary office black lead.

I also very carefully tested the action of the float, and found its capacity was correct, and that the discharging syphon always acted properly.

I also looked into the question of collecting the water received by the gauge, but found that in consequence of the large amount of the maximum daily fall observed at Falmouth it would be necessary to provide a vessel of considerable capacity to contain a fall of nearly 2 inches of rain, thereby necessitating the excavation and walling in of a large chamber. I did not think I should be justified in incurring the outlay such an operation would entail, and accordingly did not have it made.

Rubbings of the rain-gauge funnels were taken and are forwarded with this to the Meteorological Office.

I found the values of the thermograph lines to be as follows :—

| | |
|---|---|
| Upper zero lines dry | 82°·5 |
| „ „ wet | 81·0 |
| Lower zero lines dry | 16·0 |
| „ „ wet | 17·8 |

The orientation of the anemograph was verified and found correct, and is recorded on sheet No. 225, duly forwarded to the Meteorological Office.

*Radcliffe Observatory, Oxford,* visited August 17th.—Dr. Stone was absent at the time of my visit to the observatory, but I received every attention at the hands of Mr. Wickham, the chief assistant.

I found all the instruments were working in good order, but cleaned the lenses and oiled the clocks.

I had a new suspension spring fitted to the pendulum of the Beckley gauge clock, which broke when dismounted for oiling.

The thermometers were all compared with my standard, with the following results :—

| | |
|---|---|
| Dry, No. 576 | 0°·0 |
| Wet, No. 575 | −0·3 |
| Max., No. 356 | −0·2 |
| Min., No. 363 | +0·2 |

*Stonyhurst Observatory,* visited September 10th, 1891.—The instruments at this observatory were working under the charge of the Rev. W. Sidgreaves, all being in good order. The anemograph by Beck, however, is beginning to show signs of wear, and will probably require the replacement of several of its more exposed parts before many more years have elapsed.

The thermometers were compared with my standard K.S. 682, and found to have the following corrections :—

| | |
|---|---|
| Dry, No. 619 | −0°·3 |
| Wet, No. 325 | −0·4 |
| Max., M.O. 439 | −0·3 |
| Min., M.O. 501 | +0·4 |

The Beckley rain-gauge was found to be quite correct. My attention having been directed by the Meteorological Office to the exposure of the sunshine recorder, which is only raised 3 to 4 feet above the ground, I noted the following points as regards the summer houses which it is thought may possibly throw shadows upon it. The pyramidal roof of the western pavilion subtends at the glass sphere, the horizontal angle from 17° to 30° south of west, through altitudes from 3° to 10° above the horizon, and the similar roof of the eastern house from 4° to 16° south of east, and shades also from 3° to 10° above the level plane.

## II.—Anemographs.

The anemograph at Fleetwood was visited September 7th to 9th.

It was found to be in first-rate order, the loose ties of the fan were soldered up, all bearings were cleaned, and I replaced the old oil in the cups with asbestoline. I oiled clock and cleaned its escapement, which is in good order. Some slight repairs of the case, which are necessary, were ordered to be made, and the external parts were painted during my visit. The orientation was duly examined and the sheet marked.

The pavilion containing the instrument is now closed to the public, and the curves, together with two copies of the Daily Weather Report, are exhibited and consulted in the public library of the town.

*Yarmouth* anemograph.—This was found in good action and its bearings well oiled, but the following points were noted :—

The fans were found much corroded and worn, and new ones should be prepared, and if sent down with spindles made in accordance with the gauge-piece I forward to the Office with this report, could be put on by the local workman employed by Mr. Watson to oil and paint the instrument.

The cups are all fitting properly with the exception of one, which was broken away a long while ago; the iron tie applied last year was renewed.

The recorder was in good order, the clock was oiled, and the slides and fittings cleaned. The orientation was examined, and the marked curve was forwarded to the Meteorological Office.

The thermometers, which are in a wall-screen painted green, were compared and found to read corrected as follows :—

| | |
|---|---|
| Dry, B.T. 1542 | +0°·1 |
| Wet, B.T. 515 | −0·5 |
| Max., M.O. 21 | −0·4 |
| Min., M.O. 248 | +0·7 |

The maximum is not divided on its stem. The rain-gauge is in good order, and a rubbing of the funnel is forwarded herewith.

Before commencing the examination of the anemograph at this station it was found necessary to repair the step-ladder on the roof of the Sailors' Home by means of which access is gained to the external part of the instrument.

*Plymouth*, the Biological Laboratory.—I visited this institution on my return from Falmouth at the request of Mr. Dickson in order to view the site on which he intended erecting the screen, in which he was about to set up the instruments formerly observed by Dr. Merrifield.

I considered it a very suitable and convenient locality, and I understand that since my visit the thermometers have been placed there, and all particulars duly forwarded to the Meteorological Office. The thermometers were verified whilst in the possession of Dr. Merrifield, and Mr. Dickson has since compared them with a Kew standard he purchased from Kew recently, and finds the values correct.

Kew Observatory, October 1891.

I HAVE the honour to hand you herewith my report and inspection notes regarding the condition of the self-recording instruments belonging to the Meteorological Council at the following observatories and anemograph stations, and remain

Yours, &c.

R. H. Scott, Esq., F.R.S. (Signed) T. W. BAKER.

*Glasgow*, visited September 29th to October 1st.—At this observatory the instruments were all working satisfactorily, but the barograph and thermograph clocks required cleaning. This was accordingly done and new lines attached to the clock weights, also the lenses, mirrors, &c., were attended to.

During the night of September 29th the barograph clock repeatedly stopped, and on examining it the next morning one of the driving wheels was found bent. It was rectified, and since then the instrument has gone well.

The zero lines of the thermograph were changed to the winter position, and the various thermometers compared with Kew Standard 682 at 52° Fahr. and found to require the following corrections :—

| | |
|---|---|
| Dry Standard No. 550 | −0°·1 |
| Wet „ „ 472 | −0·45 |
| Maximum, No. 58,846 | +0·1 |
| Minimum, No. 63,942 | −0·1 |
| Grass minimum, No. 59,003 | −0·1 |
| Barograph thermometer (no number) | −0·8 |
| Attached thermometer to the standard barometer | −0·5 |

The anemometer was dismounted and cleaned and fresh oil applied to all the bearings. One of the fan blades was found loose; this I had resoldered before again erecting the instrument.

Afterwards the orientation was duly examined and the sheet containing the result accompanies this report.

As regards the self-recording rain gauge; it was in very good order, and did not require any special attention.

The sunshine recorder was examined on the morning of October 1st, when it was found that the glass sphere had slipped off its pedestal and was resting against the cusp of the metal bowl; in consequence the instrument was not recording, although the sun was shining brightly at the time. From an inspection of the cards it was evidently in proper action on September 27th, but in the interval the weather, according to the meteorological register, was chiefly overcast, so that very few hours of sunshine were really lost. In order, however, to prevent a recurrence of this accident, I thought it advisable to have the glass ball cemented down to its support, and Professor Grant gave instructions for this to be carried out.

*Fort William*, inspected October 3rd–5th.—Found all the instruments here in good order. The barograph and thermograph clocks where taken entirely to pieces and cleaned, and the lenses, condensers, and mirrors wiped.

The zero lines were changed to the winter position, and the standard thermometers were examined by means of Kew Standard No. 682 at 60° and the following corrections determined :—

| | |
|---|---|
| Dry standard, No. 671 | 0°·0 |
| Wet „ „ 682 | −0·2 |
| Maximum, No. 1032 | +0·1 |
| Minimum, No. 1322 | +0·3 |
| Barograph thermometer, K.O. 690 | −2·1 |
| Attached thermometer to the standard barometer, No. 72,222 | −0·1 |

NOTE.—As the reading of the minimum thermometer was rather low, I dismounted the tube from its scale and gently heated the upper end by means of a lamp. After standing the tube in a vertical position for some three hours it was again tested at 60 and found to require a correction of +0·1, thus indicating a rise of 0°·2.

The Beckley rain-gauge was found to be in good order, and the clock only required oiling. "Squeezes" of both the self-recording and spare rain-gauge funnels are appended to this report.

*Deerness, Orkney,* October 8th–9th.—The anemograph at this station was shifted from Stenness in April last under the direction of Messrs. Fortescue and Spence, and is now entirely in charge of the last-named gentleman. The instrument has been very carefully erected, and is now distant about 400 yards from the school house, the position being an excellent one, with an uninterrupted exposure from all points of the compass. The hut rests on a stone basement rising some 3½ feet above the ground, and the cups are about 17 feet from the surface of the ground.

Although the anemograph was working well at the time of my visit, I had the cups, shafts, and fans dismounted and cleaned, and all the bearings were afterwards lubricated with asbestoline. An old crack in one of the cups had given way, but this I had rivetted, and the external parts of the instrument painted before putting up again.

Mr. Spence takes a considerable interest in the work, and is fully aware of the importance and necessity of keeping the bearings well oiled.

The orientation was duly checked by compass, and the sheet containing the result is forwarded herewith.

The sunshine recorder is fixed to a wooden pedestal 6½ feet above the ground, and is in proper adjustment. On all sides the exposure is good, excepting a small farmhouse distant about 200 yards to the south-west, which might perhaps obstruct the sun's rays for a short time, though it is very questionable. Mr. Spence, however, promised to keep a look out on the recorder when the sun sets in that direction.

*Aberdeen,* October 13th–15th.—As usual everything at this observatory was found in very good order.

The barograph and thermograph had their clocks, lenses, and fittings generally cleaned. The ratchet spring of the barograph clock required repairing, which I had done before re-starting the instruments.

The various thermometers were compared with the Kew standard No. 682 in melting ice, and their corrections at 32° found to be as follows:—

| | ° |
|---|---|
| Dry standard, 597 | −0·1 |
| Wet „ 395 | −0·65 |
| Maximum, 1002 | +0·1 |
| Minimum, 5056 | 0·0 |
| Attached thermometer (to standard barometer), No. K.O., 71061 | −0·2 |
| Barograph thermometer (no number) | −2·2 |

The external portions of the anemometer were dismounted, and all parts cleaned, and fresh oil applied to the bearings. The clock and recording apparatus were also attended to, and afterwards the orientation was examined and found satisfactory.

"Squeezes" were taken of both the self-registering and spare rain-gauges, and the results accompany this report.

The Beckley gauge was cleaned generally, and the clock bearings oiled. As regards measuring the total rainfall collected by this gauge, it would be impracticable to do it with the instrument in its present position. If, however, it was shifted to the College ground there would be no difficulty, as arrangements could then be made to have a suitable chamber constructed on its new site.

*North Shields,* October 17th–18th.—The anemograph at this station was found to be in very good order, all its bearings appearing to be well oiled and quite free. I, however, had the instrument partly dismounted, with the aid of Captain Harrison's assistant, and thoroughly cleaned all its parts, after which the bearings were lubricated by asbestoline. When re-mounted it was orientated, and the sheet containing the results accompanies this report.

T. W. Baker.

Reported—That the instruments and charts had been removed from the Naval Exhibition, and that the cost incurred by the Office for fittings, &c. had been 32*l.* 5*s.*

Professor Darwin read a letter (No. 1947) (Minutes, p. 16) from Mr. Dines as to his anemometer experiments, and he was requested to communicate further with that gentleman.

Read—A letter from Mr. Baillie stating that since the last meeting 38 logs had been received, 26 of them being "excellent."

Mr. Scott was directed to present the charts as follows:—

| | |
|---|---|
| O. 92 to Lieut. J. W. Combe, R.N. | H.M.S. "Penguin." |
| O. 80 to Lieut. G. Oliver, R.N. | Do. |
| O. 90 to Chief Engineer J. J. Walker, R.N., F.L.S. | Do. |
| O. 27 to Capt. H. Davis | Barque "Alexander Lawrence." |
| Capt. Walter Martin | S.S. "German." |

and to convey the best thanks of the Council to the other observers.

Mr. Scott reported that Capt. North, an old observer, who had kept 17 "excellent" logs for the Office, had been unfortunately killed by a fall, on a voyage between Hull and Hamburg; and that a letter of condolence to his widow had already been forwarded.

**Submitted**—The following report on the 8.30 p.m. forecasts for July 1891 :—

The letters used have the following signification :—

**a**=complete success.
**b**=partial (*i.e.*, more than half) success.
**c**=partial failure.
**d**=total failure.

JULY.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 52 | 45 | 49 | 86 |
| " | b | 29 | 45 | 37 | |
| " | c | 16 | 7 | 11 | |
| " | d | 3 | 3 | 3 | |
| Scotland, E. | a | 71 | 65 | 68 | 89 |
| " | b | 16 | 26 | 21 | |
| " | c | 10 | 9 | 10 | |
| " | d | 3 | 0 | 1 | |
| England, N.E. | a | 61 | 58 | 60 | 88 |
| " | b | 20 | 36 | 28 | |
| " | c | 16 | 6 | 11 | |
| " | d | 3 | 0 | 1 | |
| England, E. | a | 68 | 61 | 65 | 92 |
| " | b | 19 | 36 | 27 | |
| " | c | 13 | 3 | 8 | |
| " | d | 0 | 0 | 0 | |
| Midland Counties | a | 55 | 71 | 63 | 88 |
| " | b | 29 | 20 | 25 | |
| " | c | 16 | 6 | 11 | |
| " | d | 0 | 3 | 1 | |
| England, S. | a | 55 | 58 | 57 | 84 |
| " | b | 19 | 36 | 27 | |
| " | c | 26 | 6 | 16 | |
| " | d | 0 | 0 | 0 | |
| Scotland, W. | a | 49 | 55 | 52 | 79 |
| " | b | 35 | 19 | 27 | |
| " | c | 6 | 16 | 11 | |
| " | d | 10 | 10 | 10 | |
| England, N.W. | a | 61 | 55 | 58 | 89 |
| " | b | 29 | 32 | 31 | |
| " | c | 10 | 10 | 10 | |
| " | d | 0 | 3 | 1 | |
| England, S.W. | a | 58 | 45 | 52 | 88 |
| " | b | 36 | 36 | 36 | |
| " | c | 3 | 13 | 8 | |
| " | d | 3 | 6 | 4 | |
| Ireland, N. | a | 45 | 71 | 58 | 91 |
| " | b | 42 | 23 | 33 | |
| " | c | 7 | 3 | 5 | |
| " | d | 6 | 3 | 4 | |
| Ireland, S. | a | 55 | 61 | 58 | 87 |
| " | b | 29 | 29 | 29 | |
| " | c | 10 | 7 | 9 | |
| " | d | 6 | 3 | 4 | |
| SUMMARY. | | | | | |
| British Isles | a | 57 | 58 | 58 | 87 |
| " | b | 28 | 31 | 29 | |
| " | c | 12 | 8 | 10 | |
| " | d | 3 | 3 | 3 | |

Submitted—The following report on the 8.30 p.m. forecasts for August 1891:—

The letters used have the following signification :—

**a**=complete success. | **c**=partial failure.
**b**=partial (*i.e.*, more than half) success. | **d**=total failure.

AUGUST.

| Districts. | | Per-centages. | | | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| | | Wind. | Weather. | Average Forecast. | |
| Scotland, N. | a | 42 | 58 | 50 | 78 |
| ,, | b | 23 | 32 | 28 | |
| ,, | c | 13 | 7 | 10 | |
| ,, | d | 22 | 3 | 12 | |
| Scotland, E. | a | 42 | 55 | 49 | 88 |
| ,, | b | 39 | 39 | 39 | |
| ,, | c | 19 | 3 | 11 | |
| ,, | d | 0 | 3 | 1 | |
| England, N.E. | a | 49 | 58 | 54 | 91 |
| ,, | b | 42 | 32 | 37 | |
| ,, | c | 6 | 10 | 8 | |
| ,, | d | 3 | 0 | 1 | |
| England, E. | a | 35 | 48 | 42 | 89 |
| ,, | b | 52 | 42 | 47 | |
| ,, | c | 10 | 10 | 10 | |
| ,, | d | 3 | 0 | 1 | |
| Midland Counties | a | 19 | 48 | 34 | 87 |
| ,, | b | 68 | 39 | 53 | |
| ,, | c | 13 | 13 | 13 | |
| ,, | d | 0 | 0 | 0 | |
| England, S. | a | 42 | 52 | 47 | 86 |
| ,, | b | 45 | 32 | 39 | |
| ,, | c | 10 | 16 | 13 | |
| ,, | d | 3 | 0 | 1 | |
| Scotland, W. | a | 29 | 58 | 44 | 76 |
| ,, | b | 39 | 26 | 32 | |
| ,, | c | 19 | 13 | 16 | |
| ,, | d | 13 | 3 | 8 | |
| England, N.W. | a | 36 | 58 | 47 | 89 |
| ,, | b | 48 | 36 | 42 | |
| ,, | c | 6 | 3 | 5 | |
| ,, | d | 10 | 3 | 6 | |
| England, S.W. | a | 23 | 45 | 34 | 78 |
| ,, | b | 48 | 39 | 44 | |
| ,, | c | 23 | 6 | 14 | |
| ,, | d | 6 | 10 | 8 | |
| Ireland, N. | a | 23 | 65 | 44 | 77 |
| ,, | b | 39 | 26 | 33 | |
| ,, | c | 32 | 6 | 19 | |
| ,, | d | 6 | 3 | 4 | |
| Ireland, S. | a | 23 | 61 | 42 | 76 |
| ,, | b | 42 | 26 | 34 | |
| ,, | c | 19 | 7 | 13 | |
| ,, | d | 16 | 6 | 11 | |
| **Summary.** | | | | | |
| British Isles | a | 33 | 55 | 44 | 83 |
| ,, | b | 44 | 34 | 39 | |
| ,, | c | 16 | 8 | 12 | |
| ,, | d | 7 | 3 | 5 | |

**Submitted**—The following statement of accounts for the six months ending 30th September 1891 :—

| Income. | £ s. d. | £ s. d. | Expenditure. | £. s. d. | £ s. d. |
|---|---|---|---|---|---|
| Balance from year 1890–91 | - - - | 2,627 17 2 | Administration : | | |
| Proportion of vote - | - - - | 7,650 0 0 | Payment of Council - | 500 0 0 | |
| Repayment of expenses charged under— | | | Secretary - - | 400 0 0 | |
| (1.) Incidental expenses | 9 15 8 | | Salaries and wages - | 396 13 0 | |
| (2.) Observatories - | 7 19 4 | | Rent, fuel, and lighting - | 349 6 10 | |
| | | 17 15 0 | Furniture and fittings* - | 48 19 9 | |
| Supply of Weather Information : | | | Incidental and contingent expenses - | 195 5 1 | |
| D.W. Charts and Forecasts - - | 122 1 5 | | Expenses incidental to International Meteorological Congress* | 1 8 0 | |
| 6 p.m. Charts - | 12 10 0 | | Pensions - - | 93 8 2 | |
| Information for Press Agencies, &c. - | 62 8 6 | | | | 1,985 0 10 |
| Telegrams - - | 73 1 2 | | Special Researches - | - - - | 472 17 4 |
| | | 270 1 1 | Land Meteorology : | | |
| Sale of Instruments, &c. : | | | Observatories and stations - - | 1,213 1 8 | |
| M.O. account - | 35 6 6 | | Discussion and reduction of observations - | 635 12 0 | |
| Royal Navy account - | 25 5 0 | | | | 1,848 13 8 |
| Mercantile Marine account - - | 39 3 4 | | Weather Information and Forecasts : | | |
| | | 99 14 10 | Telegraphic reports and storm warnings - | 1,145 2 8 | |
| Commission charged on work done for Colonies, &c. - - | - - - | 15 19 9 | Preparation and issue of reports and forecasts - - | 912 1 1 | |
| | | | | | 2,057 3 9 |
| | | | Inspections : | | |
| | | | Salaries and travelling - | - - - | 262 5 2 |
| | | | Ocean Meteorology : | | |
| | | | Discussion and reduction of observations - | 835 6 0 | |
| | | | Expenses incidental to the supply of instruments : | | |
| | | | Proportion for care and issue of instruments - | 100 0 0 | |
| | | | Royal Navy - | 182 1 1 | |
| | | | Mercantile Marine | 79 8 1 | |
| | | | Distant island and coast stations - | 21 18 8 | |
| | | | | | 1,218 13 10 |
| | | | Balance - - - | - - - | 2,836 13 3 |
| | | £10,681 7 10 | | | £10,681 7 10 |

| Liabilities. | £ s. d. | Assets. | £ s. d. |
|---|---|---|---|
| To Council - - - - | 500 0 0 | By cash at Bank - - - | 3,233 2 10 |
| „ contracts or work uncompleted - | 274 9 2 | „ „ at Office - - - | 118 2 11 |
| „ Post Office (partly estimated) - | 298 9 11 | „ sundry debtors - - - | 249 6 8 |
| „ sundry creditors - - - | 341 0 1 | „ H.M. Exchequer - - - | 650 0 0 |
| „ balance - - - - | 2,836 13 3 | | |
| | £4,250 12 5 | | £4,250 12 5 |

* Some expenses under this head not yet brought to account.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

| | |
|---|---|
| A + B (successful) - - - | = 129 |
| C (failures) - - - - | = 24 |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None; but it is probable that in the south-east of Ireland and extreme south-west of England the warnings issued on the morning of the 13th October were somewhat late.

It is evident from the Aneroid curves for Valencia and Scilly that had the Office been open, and telegrams received even as late as 2 a.m. on the 13th, the warnings would not have been issued to the south-west coasts. It was not until some two hours later that the barometric fall was sufficiently serious to cause alarm.

(Signed) FREDC. GASTER.

Telegraphic Branch,
28th October 1891.

Reported (Minutes, 1889, p. 61)—That General Ewart (Letter 1842) had informed the Office that an allowance of 1*l.* for one year had been made by the authorities for the care of the sunshine recorder at St. Helier's, Jersey.

Read—Letter 1526 from Mr. Hugh Williams, Holyhead, asking for a gratuity to William Williams, who was now retiring and who had had charge of the anemometer at that station for 20 years. A gratuity of 4*l.*, one year's pay, was granted.

Submitted—The following statement of work for the three months ending September 30th :—

MARINE BRANCH.

October 16, 1891.

Examined 37 new logs and 6 lighthouse registers.

Considerable progress made with the discussion of the observations in the district between the Cape of Good Hope and New Zealand. Office logs have been exhausted up to date. All available data in the logs of Her Majesty's ships received for Ocean Current work have been utilised, and 128 naval logs covering more recent years specially obtained from the Public Record Office. Application made to one hundred private shipping firms for the loan of such logs as might contain any information relating to the district. A small amount of valuable data has in this way been obtained for the higher latitudes, where observations are scanty. Some progress made with the summing of the wind and sea-temperature observations.

The work connected with the charting of Ocean Currents has been advanced by the addition of observations from 1,000 logs of the Royal Navy, and from the logs of merchant vessels lent by the owners for the Cape to New Zealand district.

Drafting monthly notes on the wind, barometer, air and sea temperature, currents, and specific gravity over the area covered by the Red Sea charts.

The Guardafui charts were passed for press in July, and the work has since been published.

The logs and documents used for the discussion of the cyclones of May and June 1885 in the Arabian Sea and Gulf of Aden have been returned to the respective owners.

Indexing data in Ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.
(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(July, August, and September 1891.)

*Monthly Weather Report*, 1881.—Very little progress made beyond completion of maps, tables, &c. for January, February, and March.

*Weekly Weather Report*, 1891.—All numbers issued promptly. Various appendices fairly well in hand, but interrupted by summer vacations and sickness of staff.

*Quarterly Summary*, second part (April to June), issued in good time.

*Monthly Summaries.*—January and February in proof. March to July are partly prepared, *i.e.*, tables and rough maps are ready.

*Daily Weather Report*, 1891.—All numbers issued promptly to date; monthly corrections and addition sheets issued te end of August.

*Primary Checking of Storm Warnings*, 1891.—Done to date.

*Primary Checking of* 8.30 *p.m. Forecasts.* — Slightly in arrears owing to vacations and sickness.

*Final Checking of Storm Warnings*, 1890.—Completed and results handed in.

*Maps and Forecasts for Royal Naval Exhibition.*—Prepared and issued promptly twice daily.
*Hay Harvest Forecasts,* 1891.—Issued promptly. Issue completed.
*Plotting of Rainfall Stations on Maps* (*re* Mr. Symons' proposals). Completed and handed in.
The summer vacation has now been taken by nearly the whole of the staff.
There has been very serious hindrance to the work of the Branch owing to much sickness among the members of the staff, and in one case death of a child.
Mr. Rigby and Mr. Francis were those most affected. The greatest credit is due to the other members for the willingness with which they worked and adapted their time, &c. to the Office wants in order to make up for the loss of power caused by the sickness, &c. referred to.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

October 1, 1891.

*Hourly Means.*

The whole of the mean values for 1888 have been completed and sent to the printer, and the proof sheets for about one-half of the work have been read and passed for press.
The calculation of the five-day means for 1889 is now in hand.

*Miscellaneous.*

A good deal of work has been done on the sunshine returns of the past 10 ten year for Mr. Scott s Report, and the cards for several months have been tabulated.
The usual routine work of the room has been kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

October 1, 1891.

*Examinations.*

*June and July* 1891.—Completed, with the exception of the Kew thermograms, awaiting the determination of scale and zero line values for new wet bulb.
Weekly examination (on receipt) of curves and documents.

*Reports.*

*May–July* 1891.—Copies of "Notes of Errors" to all observatories.

*General.*

*Diurnal Range of Rainfall,* 1880–1890.—Extracting the Hourly Values of Stonyhurst and Glasgow, 1884–1890, and totalling and copying into monthly forms.
Checking the daily maximum and minimum values and times of the barograph for all stations, May–July 1889.
Measurements and calculations *re* the determination of the Fort William barograph and thermograph scales, and zero line values proceeded with.
Preparing and copying notes for the annual inspections of observatories.
Various minor matters and work of a routine character, have occupied some time, and, in addition, the annual vacation and absence from other causes have occurred during the period under notice.

(Signed) T. E. ALLEN.

Submitted—The following—

MEMORANDUM as to INSTRUMENTS required for STOCK.

| | £ | s. | d. |
|---|---|---|---|
| 6 Fishery barometers, probable cost - - - | 24 | 6 | 0 |
| 6 Rain-gauges " " - - - | 12 | 0 | 0 |
| 24 Signal cones " " - - - | 15 | 6 | 0 |
| 12 Frames for telegrams " " - - - | 1 | 10 | 0 |
| Total - - - - | 53 | 2 | 0 |

(Signed) R. STRACHAN,
October 28, 1891.

To the Secretary,
Meteorological Office.

—Approved.

Submitted—The following list of publications which had been received since the last meeting :—

*Aitken, James.*—Meteorological table for the year 1890. Compiled from observations taken at Braemar.

*Aitken, John.*—On a method of observing and counting the number of water particles in a fog.

*Beaumont H. B. de.*—Présentation, avec cartes nouvelles, d'une cartographie générale pour le meilleur enseignement de la géographie.

*Berlin, K. Preussisches meteorologisches Institut.*—Ergebnisse der meteorologischen Beobachtungen. 1888, 1891, Heft 1.

*Blanford, H. F.*—On the variations of the rainfall at Cherra Poonjee in the Khasi Hills, Assam.

*Brodie, F. J.*—Some remarkable features in the winter of 1890–91.

*Bucharest, Institutul Meteorologic al Romaniei.*—Analele. Tom. iv. 1888.

*Cairo, Administration des Services Sanitaires et d'Hygiène Publique.*—Bulletin hebdomadaire. 1891. Nos. 1–27.

*Calcutta, Meteorological Office, Bengal.*—Summary of the Meteorology of the year 1890.

—— —— Administration report of the Meteorological Reporter to the Government of Bengal for the year 1890–91.

*Calcutta, Meteorological Office, India.*—Memorandum on the snowfall in the mountain districts bordering Northern India, and the abnormal features of the weather in India during the past five months, with a forecast of the probable character of the south-west monsoon rains of 1891.

—— —— Report on the meteorology of India in 1889.

—— —— Cyclone memoirs, Part IV. An inquiry into the nature and course of storms in the Arabian Sea, and a catalogue and brief history of all recorded cyclones in that sea from 1648 to 1889, by W. L. Dallas.

*Cape Town, Meteorological Commission, Cape of Good Hope.*—Report. 1890.

*Chandler, A.*—Sunshine and rainfall of August 1891.

*Chemnitz, K. Sächsisches meteorologisches Institut.*—Jahrbuch, 1889.

—— —— Ergebnisse der meteorologischen Beobachtungen im Königreich Sachsen im Jahre. 1890.

*Clayton, H. H.*—Cloud heights and velocities at Blue Hill Observatory.

*Coimbra, Observatorio Meteorologico e Magnetico.*—Observações magneticas. 1878–90.

—— —— Observações meteorologicas. 1890.

*Colombo, Surveyor General's Office.*—Return of rainfall in Ceylon during 1890, and the means during different periods.

*Cracow, C. K. Akademii umiejetnósci w Krakowie.*—Materyjaly do Klimatografii Galicyi. 1890.

*Croydon Microscopical and Natural History Club.*—Report of the Meteorological Committee. 1890.

*Dove, K.*—Studien über Ostafrika. iii. Die mutmaaslichen Verbreitungsgrenzen der Malaria in Ostafrika.

*Erk, F.*—Die Windhose vom 27 Juni 1890 am Südabhange der Daxsteiner Höhe.

—— —— Die internationale Conferenz der Repräsentanten der meteorologischen Dienste aller Länder in München (26 Aug. bis 2 Sept. 1891).

*Geelmuyden, H.*—Magnetische Beobachtungen und stündliche Temperaturbeobachtungen im Terminjahre August 1882—August 1883 angestellt auf der Universitätssternwarte in Christiania.

*Halle, Kaiserliche leopoldino-carolinische deutsche Akademie der Naturforscher.*—Leopoldina. xxvi. 1890.

*Hamberg, H. E.*—La radiation des nuages supérieurs autour des minima barométriques.

*Hamburg, Deutsche Seewarte.*—Aus dem Archiv der Deutschen Seewarte. 1890.

*Hann, J.*—Studien über die Luftdruck- und Temperaturverhältnisse auf dem Sonnblickgipfel, nebst Bemerkungen über deren Bedeutung für die Theorie der Cyclonen und Anticyclonen.

*Hayden, E.*—The Samoan hurricane of March 1889.

*Hazell's Annual* for 1891.

*Hellmann, G.*—Meteorologische Volksbücher.

*Hildebrandsson, H. H.*—Ueber den Werth der Messungen von Zugrichtung und Höhe der Wolken für die meteorologische Wissenschaft.

—— Rapport sur la classification des nuages.

*Hobart, Royal Society of Tasmania.*—Papers and proceedings for 1890.

*Hong Kong Observatory.*—Observations. 1889.

*Horn, F., und Tillmann, C.*—Beobachtungen über Gewitter in Bayern, Württemberg, Baden und Hohenzollern während des Jahres 1890.

*Irkutsk, Observatorium.*—Die Beobachtungen des meteorologischen und magnetischen Observatoriums in Irkutsk im Jahre 1889.

*Kammermann, A.*—Résumé Météorologique de l'année 1890 pour Genève et le Grand Saint-Bernard.

*Klengel, F.*—Die historische Entwickelung des Begriffs der Schneegrenze von Bouguer bis auf A. v. Humboldt. 1736–1820.

*Lahore, Sanitary Commissioner*—Report on the Sanitary Administration of the Punjab for the year 1890.

*Lang, C.*—Die Fortpflanzungsgeschwindigkeit der Gewitter in Süddeutschland während des Jahres 1890.

*London, Army Medical Department.*—Report. 1889.

*London, Board of Trade.*—Abstracts of the returns made to the Board of Trade of shipping casualties from July 1889 to June 1890.

*London, Meteorological Office.*—Meteorological observations at stations of the second order. 1887.

—— —— Meteorological charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún.

—— —— Daily weather charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea.

*Madras, Meteorological Office.*—Administration reports of the Meteorological Reporter to the Government of Madras. 1886-7—1889-90.

*Madrid, Observatorio.*—Resumen de las observaciones meteorológicas efectuadas en la Peninsula y algunas de Sus Islas adyacentes durante los años 1887 y 1888.

*Manson, M.*—Physical and geological traces of permanent cyclone belts.

*Morize, H.*—Esboço de uma climatologia do Brazil.

*Paris, Observatoire Municipal de Montsouris.*—Annuaire pour l'an 1891.

*Rajna, M.*—La meteorologia moderna e la formazione delle precipitazioni.

*Riggenbach, A.*—Die Niederschlags-Verhältnisse von Basel.

*St. Petersburg, Physikalisches Central-Observatorium.*—Annalen. 1890. Theil I.

*Schreiber, P.*—Anträge und Darlegungen zu den Fragen 3, 6, 8, 25, 26, 27, 30, 48, 49, des provisorischen Programms vom 1 July 1891 für die Verhandlungen der Versammlung der Directoren der meteorologischen Centralstellen der Erde in München.

*Schück, A.*—Taifun im Süden der Meiaco sima Gruppe (N. W. Pacifik) 1865, Sept. 2–5–6.

—— Zwei Taifune in der China-See, deren Zentrum nach einer südlich von West liegenden Richtung zog. 1870, Oct. 9–14 u 1872, Sept. 10–14.

*Singapore, Principal Civil Medical Officer.*—Annual meteorological report, Straits Settlements, for the year 1890.

*Stockholm, Académie Royale des Sciences de Suède.*—Observations faites au Cap Thordsen, Spitzberg, par l'Expédition Suédoise. Tome I.

—— —— Meteorologisker Iakttagelser i Sverige. 1886.

*Sundell, A. F.*—Åskvädren i Finland 1890.

*Sydney Observatory.*—Meteorological observations at Sydney. 1865–1877.

—— —— Weather Charts. December 1890–June 1891.

*Symons, G. J.*—British rainfall, 1890.

*Tananarive, Observatoire Royal de Madagascar.* — Observations météorologiques faites à Tananarive par E. Colin. Vol. ii. 1890.

*Tonga.*—Statistics of the Tonga Islands for the year 1890.

*Trieste, Osservatorio Marittimo.*—Rapporto annuale contenente le osservazioni meteorologische e mareografiche di Trieste e la osservazioni meteorologische di alcune altre stazioni Adriatiche per l'anno 1888.

*Turin, Società Meteorologica Italiana.*—Il xxv Anniversario.

*Unterweger, J.*—Über die Kleinen Perioden der Sonnenflecken und ihre Beziehung zu einigen periodischen Erscheinungen der Erde.

*Utrecht, Koninklijk Nederlandsch Meteorologisch Instituut.*—Nederlandsch meteorologisch Jaarboek. 1890.

—— —— Routen voor Stoomschepen tusschen Aden en Nederlandsch Oost—Indie.

*Veeder, M. A.*—The Zodiacal light.

*Washington, Department of Agriculture.*—Reports. 1888, 1890.

*Washington, Signal Office.*—Bibliography of meteorology. Part IV. Storms.

—— —— Charts showing the isobars, isotherms, and winds in the United States for each month from January 1871 to December 1873.

—— —— Charts showing the probability of rainy days, prepared from observations for 18 years.

—— —— Charts showing the average monthly cloudiness in the United States.

—— —— Normal temperature charts by decades for the United States and the Dominion of Canada.

*Wellington, Meteorological Office.*—Meteorological observations in New Zealand. 1890.

*Wetzel, C.*—Davoser Wetterkarte für das Jahr 1886, 1891, May—Juli.

*Yale Observatory.*—Report for the year 1890-91.

*Zürich, Schweiz. Departement des Innern.* — Tabellarische Zusammenstellung der Haupt-Ergebnisse für 1887, 1888.

—— —— Graphische Darstellung der schweizerischen hydrometrischen Beobachtungen. 1890.

THE First Annual General Meeting of the Meteorological Council was held at No. 63, Victoria Street, S.W., on Wednesday, November 18th, 1891, at the hour of 2 p.m.

The following Members were present:—

Lieut.-Gen. R. STRACHEY, R.E., Chairman, in the Chair.
Mr. ALEXANDER BUCHAN.
Mr. FRANCIS GALTON.
Mr. EDWARD J. STONE.
Captain WILLIAM J. WHARTON, R.N.
Mr. ROBERT H. SCOTT (Secretary).

Read—The following letter, which was ordered to be printed on the Minutes:—

(M.O. 1711.)

Board of Trade, (Railway Department,)
London, S.W., September 25, 1891.

SIR,

I AM directed by the Board of Trade to acknowledge the receipt of your letter of the 23rd instant; and, in reply, to return to you one copy of the Memorandum and Articles of Association of the Meteorological Council with the licence of the Board of Trade, under the 23rd section of "The Companies Act, 1867," annexed thereto.

This copy should be tendered to the Registrar of Joint Stock Companies, Inland Revenue, Somerset House, W.C., for registration. The duplicate signed copy will be retained in this Department.

I am, &c.
(Signed) GEORGE J. SWANSTON.

The Secretary, Meteorological Office,
63, Victoria Street, S.W.

## METEOROLOGICAL COUNCIL.

### MEMORANDUM OF ASSOCIATION.

1. The name of the Association is "THE METEOROLOGICAL COUNCIL."
2. The registered office of the Association will be situate in England.
3. The objects for which the Association is established are:—
   (1.) The administration of the Parliamentary Grant for Meteorological purposes.
   (2.) The management of the Meteorological Office.
   (3.) The doing all such lawful things as are incidental or conducive to the attainment of the above objects. Provided that the Association shall observe any lawful conditions or directions imposed or given by the Lords Commissioners of the Treasury as to the administration of the said Grant or the form of receipt to be given for payment of it.
4. The income and property of the Association, wheresoever derived, shall be applied solely towards the promotion of the objects of the Association as set forth in this Memorandum of Association; and no portion thereof shall be paid or transferred directly or indirectly, by way of dividend, bonus, or otherwise howsoever by way of profit, to the Members of the Association.

Provided that nothing herein shall prevent the payment, in good faith, of remuneration to any officers or servants of the Association, or to any Member of the Association, or other person, in return for any services actually rendered to the Association.

5. The fourth paragraph of this Memorandum is a condition on which a licence is granted by the Board of Trade to the Association in pursuance of section 23 of the Companies Act, 1867.

6. If any Member of the Association pays or receives any dividend, bonus, or other profit, in contravention of the terms of the fourth paragraph of this Memorandum, his liability shall be unlimited.

7. Every Member of the Association undertakes to contribute to the assets of the Association, in the event of the same being wound up during the time that he is a Member, or within one year afterwards, for payment of the debts and liabilities of the Association contracted before the time at which he ceases to be a Member, and of the costs, charges and expenses of winding up the same, and for the adjustment of the rights of the contributories amongst themselves, such amount as may be required not exceeding one pound, or in case of his liability becoming unlimited, such other amount as may be required in pursuance of the last-preceding paragraph of this Memorandum.

8. If upon the winding up or dissolution of the Association there remains, after the satisfaction of all its debts and liabilities, any property whatsoever, the same shall not be paid to or distributed among the Members of the Association, but shall be transferred to the Lords Commissioners of the Treasury, and on any winding up the Association shall consent to the appointment of any liquidator who may be nominated by the said Commissioners.

9. True accounts shall be kept of the sums of money received and expended by the Association and the matter in respect of which such receipt and expenditure takes place, and of the properties, credits, and liabilities of the Association; and, subject to any reasonable restrictions as to the time and manner of inspecting the same that may be imposed in accordance with the regulations of the Association for the time being, shall be open to inspection of the Members. The accounts of the Association shall be submitted quarterly to the Treasury for audit, or to any auditor or auditors to be appointed from time to time by the Lords Commissioners of the Treasury, and the remuneration of such auditors shall be paid by the Association, but the Lords Commissioners of the Treasury shall not in any way be required to see to the application of the funds of the Association or be responsible for their misapplication or for any of the debts or liabilities that may be incurred by the Association.

We, the several persons whose names and addresses are subscribed, are desirous of being formed into an Association in pursuance of this Memorandum of Association.

NAMES, ADDRESSES, AND DESCRIPTIONS OF SUBSCRIBERS.

1. RICHARD STRACHEY, Lt. Gen., R.E.,
69, Lancaster Gate, London.
*Witness:* C. W. Baillie, Nav. Lieut., R.N.,
10, Crooms Hill, Greenwich Park.

2. ALEXANDER BUCHAN, Sec., Scott. Met. Soc.,
72, Northumberland Street, Edinburgh.
*Witness:* C. W. Baillie, Nav. Lieut., R.N.

3. G. H. DARWIN,
University, Cambridge.
*Witness:* H. F. Newall, M.A.,
Trumpington, Cambridge.

4. FRANCIS GALTON (private gentleman),
42, Rutland Gate, London, S.W.
*Witness:* C. W. Baillie, Nav. Lieut., R.N.

5. E. J. STONE, Radcliffe Observer,
Radcliffe Observatory, Oxford.
*Witness:* W. Wickham, First Assistant, Radcliffe Observatory, I, Rock Villas, St. John's Road, Oxford.

6. W. J. L. WHARTON, Admiralty,
Capt. R.N., and Hydrographer.
*Witness:* Alice Campleman, spinster,
nurse to Capt. Wharton, Florys, Wimbledon.

7. ROBERT H. SCOTT (private gentleman),
6, Elm Park Gardens, London, S.W.
*Witness:* C. W. Baillie, Nav. Lieut., R.N.

Dated the 23rd day of September 1891.

ARTICLES OF ASSOCIATION.

(1.) For the purposes of registration the number of the Members of the Association is declared not to exceed ten.

(2.) These Articles shall be construed with reference to the provisions of the Companies Act, 1862, and the Companies Act, 1867, and terms used in these Articles shall be taken as having the same respective meanings as they have when used in these Acts.

(3.) The Association is established under the authority of the Lords Commissioners of the Treasury for the purposes expressed in the Memorandum of Association.

(4.) *Qualification of Members.*—The Association consists of the Members and the Secretary of the Meteorological Council.

(5.) *Admission of Members.*—The Members of the Meteorological Council are nominated by the President and Council of the Royal Society, with the exception of the Hydrographer to the Admiralty, who is a Member *ex officio*, and the Secretary of the Meteorological Council is appointed by the Council.

(6.) *Honorary Officers and their Elections.*—The Chairman is nominated by the Royal Society.

(7.) *Management of the Association.*—The business is to be managed by the Members of the Association, the remuneration of whom, if any, is to be such as may be sanctioned by the Treasury.

(8.) *Meetings, Proceedings, &c.*—The First General Meeting of the Association shall be held within four months after the registration of the Memorandum of Association. A General Meeting shall be held at least once in each year, in accordance with section 49 of the Companies Act of 1862. The Ordinary Meetings of the Association shall be held as the Council shall direct, and their proceedings shall be regularly recorded and printed.

The Association shall submit yearly a Report of its Proceedings to the Royal Society for presentation to Parliament.

(9.) *Accounts, Audit.*—The annual Estimates shall be submitted for approval to the Treasury, and the accounts, after examination by two Members of the Association, shall be sent to the Treasury for audit.

(10.) A notice may be served by the Association upon any Member, either personally or by sending it through the post as a prepaid letter addressed to such Member, at his registered place of abode.

Any notice, if served by post, shall be deemed to have been served at the time when the letter containing the same would be delivered in the ordinary course of the post, and in proving such service it shall be sufficient to prove that the letter containing the notice was properly addressed and put into the Post Office.

NAMES, ADDRESSES, AND DESCRIPTIONS OF MEMBERS.

1. RICHARD STRACHEY, Lt. Gen., R.E., 69, Lancaster Gate, London.
   *Witness:* C. W. Baillie, Nav. Lieut., R.N., 10, Crooms Hill, Greenwich Park.
2. ALEXANDER BUCHAN, Sec., Scott. Met. Soc. 72, Northumberland Street, Edinburgh.
   *Witness:* C. W. Baillie, Nav. Lieut., R.N.
3. G. H. DARWIN, University, Cambridge.
   *Witness:* H. F. Newall, M.A., Trumpington, Cambridge.
4. FRANCIS GALTON (private gentleman), 42, Rutland Gate, London, S.W.
   *Witness:* C. W. Baillie, Nav. Lieut., R.N.
5. E. J. STONE, Radcliffe Observer, Radcliffe Observatory, Oxford.
   *Witness:* W. Wickham, First Assistant, Radcliffe Observatory, 1, Rock Villas, St. John's Road, Oxford.
6. W. J. L. WHARTON, Admiralty, Capt. R.N., and Hydrographer.
   *Witness:* Alice Campleman, spinster, Nurse to Capt. Wharton, Florys, Wimbledon.
7. ROBERT H. Scott (private gentleman), 6, Elm Park Gardens, London, S.W.
   *Witness:* C. W. Baillie, Nav. Lieut., R.N.

Dated the 23rd day of September 1891.

| No. 34945 C. | N.L. 34014. |
|---|---|

CERTIFICATE OF INCORPORATION

OF THE

METEOROLOGICAL COUNCIL.

I HEREBY certify, that the Meteorological Council (the word "Limited" being omitted by licence of the Board of Trade) is this day incorporated under the Companies' Acts, 1862 to 1890, and that the Company is limited.

Given under my hand at London this eighth day of October, One thousand eight hundred and ninety-one.

Fees and deed stamps, £3 5*s.*

Stamp duty on capital, £

(Signed) ERNEST CLEAVE,
Assistant Registrar of Joint Stock Companies.

**The Secretary was instructed to procure a Common Seal for the Council.**

**The Minutes of last meeting, October 28th, were read and confirmed.**

Submitted—The following memoranda :—

MATERIALS for preparing ESTIMATES for 1892–93.

| | Actual Expenditure 1890–91. | Estimated Expenditure 1892–93. | Proposed for 1892–93. | Voted for 1891–92. |
|---|---|---|---|---|
| *Administration :* | £ | £ | £ | £ |
| (1.) Council | - | 1,000 | 1,000 | 1,000 |
| (2.) Secretary | - | 800 | 800 | 800 |
| (3.) Salaries : | - | 790 | 790 | 780 |
| Chief Clerk | 333 | | | |
| 1 Junior Clerk | 200 | | | |
| 2 unclassified clerks | 83 | | | |
| Office Keeper | 109 | | | |
| Messengers | 64 | | | |
| | 789 | | | |
| (4.) Rent, fuel, and lighting | - | 713 | 710 | 720 |
| Rent | 635 | | | |
| Fuel | 55 | | | |
| Gas | 23 | | | |
| | 713 | | | |
| (5.) Incidental and contingent expenses | - | 580 | 460 | 420 |
| Office Keeper's contingent account, including porter's allowance for cleaning, &c. | 204 | | | |
| Postage | 58 | | | |
| Furniture and Office repairs | 438 | | | |
| Carriage of parcels, &c. | 15 | | | |
| Copying synchronous observations | 5 | | | |
| Books and printing | 63 | | | |
| Sundries (including International Meteorology) | 97 | | | |
| | 880 | | | |
| Deduct (1) repayments under this head including Commission £65 | | | | |
| „ (2) Special outlay for sanitary alterations £235 | 300 | | | |
| | 580 | | | |
| (6.) Pensions | - | 187 | 190 | 190 |
| Capt. H. Toynbee | 144 | | | |
| Mr. J. S. Harding, senr. | 43 | | | |
| | 187 | | | |
| *Special Researches and Experiments* | - | 1,000 | 1,000 | 1,000 |
| (1.) Researches : | | | | |
| Bridled anemometer (Holyhead) | 27 | | | |
| Cloud experiments | 34 | | | |
| Sunshine cards, &c. | 31 | | | |
| Electrical anemometer | 13 | | | |
| Discussing R.E. and other observations | 27 | | | |
| Dines's anemometer experiments | 72 | | | |
| Calculation of hourly means | 83 | | | |
| Sundries | 33 | | | |
| | 320 | | | |
| (2.) Salaries : | | | | |
| 1 Junior Clerk £145 | | | | |
| Female staff £282 | | | | |
| | 427 | | | |
| | 747 | | | |
| Transfer from head *Land Meteorology*, § 2 | 250 | | | |
| N.B.—There will probably be a slight reduction under the head of salaries. | | | | |
| | 997 | | | |
| Carried forward | - | 5,070 | 4,950 | 4,910 |

| | Actual Expenditure 1890–91. | Estimated Expenditure 1892–93. | Proposed for 1892-93. | Voted for 1891-92. |
|---|---|---|---|---|
| | £ | £ | £ | £ |
| Brought forward | - - | 5,070 | 4,950 | 4,910 |
| *Land Meteorology* : | | | | |
| (1.) Observatories and stations | - - | 2,209 | 2,200 | 2,250 |
| Aberdeen | 275 | | | |
| Armagh | 51 | | | |
| Ben Nevis | 100 | | | |
| Falmouth | 250 | | | |
| Fort William | 270 | | | |
| Glasgow | 75 | | | |
| Kew | 404 | | | |
| Stonyhurst | 55 | | | |
| Valencia (including rent) | 517 | | | |
| Anemograph stations | 66 | | | |
| Meteorological Societies (Observations 2nd Order) | 215 | | | |
| Instruments | 8 | | | |
| Sundries | 23 | | | |
| | 2,309 | | | |
| Deduct for extra expenses under Meteorological Societies and Fort William, say | 100 | | | |
| | 2,209 | | | |
| (2.) Salaries :—Discussion and reduction of observations | - - | 1,302 | 1,300 | 1,200 |
| 2 Senior Clerks | 510 | | | |
| 7 Junior Clerks | 790 | | | |
| 4 Unclassified Clerks and Supernumerary | 197 | | | |
| | 1,497 | | | |
| Add for present salaries and increments authorised | 55 | | | |
| | 1,552 | | | |
| Transfer to head *Special Researches* | 250 | | | |
| | 1,302 | | | |
| *Weather Information and Forecasts* | - - | 1,962 | 1,940 | 2,030 |
| (1.) Telegraphic reports and storm warnings :— | | | | |
| Reports from inland stations | 578 | | | |
| Reports from abroad | 99 | | | |
| Reports sent abroad | 378 | | | |
| Storm warnings | 227 | | | |
| Hay harvest forecasts | 37 | | | |
| Private wires | 91 | | | |
| Payments to reporters, &c. | 685 | | | |
| Sundry telegrams, forecasts, &c. | 18 | | | |
| Postage of charts and incidental expenses | 238 | | | |
| Instruments, &c. | 44 | | | |
| Wrappers, printing, &c. | 43 | | | |
| Weather Boards | 36 | | | |
| Weekly Reports | 48 | | | |
| Synchronous charts | 38 | | | |
| Sundries | 5 | | | |
| | 2,565 | | | |
| Deduct :— | | | | |
| Repayments during the same period | 703 | | | |
| N.B.—The receipts refer partly to another year. The true amount is about 600*l*. | | | | |
| | 1,862 | | | |
| Carried forward | - - | 10,543 | 10,390 | 10,390 |

| | Actual Expenditure 1890–91. | Estimated Expenditure 1892–93. | Proposed for 1892–93. | Proposed for 1891–92. |
|---|---|---|---|---|
| | £ | £ | £ | £ |
| Brought forward | - - | 10,543 | 10,390 | 10,390 |
| (2.) Salaries:—Preparation and issue of reports and forecasts | - - | 1,834 | 1,800 | 1,800 |
| 1 Senior Clerk (9 hours daily) | 309 | | | |
| 7 Junior Clerks (5 work 9 hours daily) | 1,122 | | | |
| 2 Unclassified Clerks | 104 | | | |
| 1 Messenger | 65 | | | |
| Addition for late evening and Sunday attendance | 210 | | | |
| | 1,810 | | | |
| Add for present salaries and increments authorised | 24 | | | |
| | 1,834 | | | |
| *Inspections* | - - | 567 | 550 | 550 |
| Mr. Baker | 30 | | | |
| „ Buchan, salary and expenses | 199 | | | |
| „ Ley „ „ „ | 199 | | | |
| Royal Meteorological Society | 25 | | | |
| Mr. Scott | 62 | | | |
| Captain Toynbee | 139 | | | |
| Mr. Whipple | 52 | | | |
| | 706 | | | |
| Deduct special payments not likely to recur | 139 | | | |
| | 567 | | | |
| *Ocean Meteorology:* | | | | |
| (1.) Salaries:—Discussion and reduction of observations:— | - - | 1,674 | 1,650 | 1,590 |
| Marine Superintendent | 350 | | | |
| 1 Senior Clerk (in charge of instruments) | 333 | | | |
| 1 „ „ ( „ Marine Rooms) | 275 | | | |
| 5 Junior Clerks | 760 | | | |
| 2 Unclassified Clerks | 90 | | | |
| | 1,808 | | | |
| Add for present salaries and increments authorised | 66 | | | |
| | 1,874 | | | |
| Deduct proportion chargeable to care and issue of instruments (say) | 200 | | | |
| | 1,674 | | | |
| (2.) Salaries:—Proportion chargeable to care and issue of instruments | - - | 200 | 200 | 200 |
| (3.) Supply of instruments to the Royal Navy | - - | (*a*) 550 | 500 | 400 |
| Instruments, repairs, &c. | 491 | | | |
| Verifications | 54 | | | |
| Packing cases | 21 | | | |
| | 566 | | | |
| (4.) Supply of instruments, &c. to Mercantile Marine | - | (*a*) 275 | 190 | 350 |
| Instruments, repairs, &c. | 67 | | | |
| Verifications | 10 | | | |
| Agents' fees, &c. | 104 | | | |
| Presentation labels | 3 | | | |
| Sundries | 6 | | | |
| [Receipts during the same period under heads (3) and (4), 90*l.*, not allowed for.] | 190 | | | |
| (*a*) The estimated expenditure under sub-heads (3) and (4) is taken as the approximate mean of two years ending 31st March 1891. | | | | |
| (5.) Distant island or coast stations | 5 | 20 | 20 | 20 |
| There are no regular payments under this head. | | | | |
| Totals £ | - - | 15,663 | 15,300 | 15,300 |

N.B.—The figures show a possible excessive expenditure of about 300*l.*

## Synopsis of Office Salaries and Pensions.*

| Service. | 1892-93. | 1891-92. | 1892-93. Increase. | 1892-93. Decrease. |
|---|---|---|---|---|
| | £ | £ | £ | £ |
| Administration | 1,590 | 1,590 | — | — |
| Special Researches | 677 | 702 | — | 25 |
| Land Meteorology | 1,302 | 1,214 | 88 | — |
| Weather Information | 1,834 | 1,825 | 9 | — |
| Ocean Meteorology | 1,874 | 1,818 | 56 | — |
| Pensions | 187 | 187 | — | — |
| Totals £ | 7,464 | 7,336 | 153 | 25 |

* From column "Actual expenditure."

## Meteorological Office. Estimates for the Year 1892–93.

| Heads of Service. | Proposed for 1892-93. | | Voted for 1891-92. | | 1892-93. Increase. | 1892-93. Decrease. |
|---|---|---|---|---|---|---|
| *Administration:* | £ | £ | £ | £ | £ | £ |
| Payment of Council | 1,000 | | 1,000 | | | |
| Secretary | 800 | | 800 | | | |
| Salaries and wages | 790 | | 780 | | | |
| Rent, fuel, and lighting | 710 | | 720 | | | |
| Incidental and contingent expenses | 460 | | 420 | | | |
| Pensions | 190 | | 190 | | | |
| | | 3,950 | | 3,910 | 40 | — |
| *Special Researches and Experiments:* | | | | | | |
| Salaries | 67[illegible] | | 702 | | | |
| Other charges | 330 | | 298 | | | |
| | | 1,000 | | 1,000 | — | — |
| *Land Meteorology:* | | | | | | |
| Observatories and stations | 2,200 | | 2,250 | | | |
| Salaries:—Discussion and reduction of observations | 1,300 | | 1,200 | | | |
| | | 3,500 | | 3,450 | 50 | — |
| *Weather Information and Forecasts:* | | | | | | |
| Telegraphic reports and storm warnings | 1,940 | | 2,030 | | | |
| Salaries:—Preparation and issue of reports and forecasts | 1,800 | | 1,800 | | | |
| | | 3,740 | | 3,830 | — | 90 |
| *Inspections:* | | | | | | |
| Salaries and travelling expenses | | 550 | | 550 | — | — |
| *Ocean Meteorology:* | | | | | | |
| Salaries:—Discussion and reduction of observations | 1,650 | | 1,590 | | | |
| Expenses incidental to the supply of instruments: | | | | | | |
| Care and issue of instruments | 200 | | 200 | | | |
| Royal Navy | 500 | | 400 | | | |
| Mercantile Marine | 190 | | 350 | | | |
| Distant island (and coast) stations | 20 | | 20 | | | |
| | | 2,560 | | 2,560 | — | — |
| Totals £ | | 15,300 | | 15,300 | 90 | 90 |

Note.—The expenditure connected with the purchase of the lease of Westwood House, and work required consequent on the transfer of the observatory, will be charged as an extraordinary item against the accumulated balance at the credit of the Council.

The estimates were approved, and the Secretary was instructed to forward a copy to the Treasury (P.C. 2230).

The Chairman made a verbal communication as to a proposed circular to the recipients of the publications of the Office (Minutes, p. 20). The circular was ordered to be printed.

Submitted—The chart showing the distribution of rainfall stations available for the decade 1881–1890 on Mr. Symons's list (Minutes, p. 24). The subject was referred to Mr. Buchan.

Read—Letters (Nos. 1807 and 2043) from the Colonial Office, stating that the Government of St. Helena was now ready to receive the anemometer and other instruments proposed to be lent (Minutes, 1890, p. 84), and requesting the Council to make some annual allowance to the observers.

Mr. Scott was instructed to inform the Colonial Office (P.C. 2176) that the Council were prepared to lend the anemometer and to allow 10*l.* per annum for its care for three years, the grant then to be subject to reconsideration. Also if the same observer will undertake with the above allowance to register the barometer, thermometers, and rain-gauge, the Council will lend the instruments. The cost of erection of the anemometer will be borne by the Council. Copies of the observations are to be sent regularly to the Meteorological Office.

Read—Letter (No. 2023) from Lloyd's stating that their station at the North Foreland was now in operation (Minutes, 1888, p. 73, 1889, p. 34), and that the Committee would be ready to allow it to be used as a telegraphic reporting station.

Mr. Scott was authorised to make the necessary arrangements. (P.C. 2147.)

The letter from the Coastguard Office *re* telephone at Mullaghmore (Minutes, p. 24) was again considered.

Mr. Scott was instructed to reply that the Council were not able to make any change in the arrangements at Mullaghmore, but that they had informed Mr. Kerr, their observer at that station, that he had acted improperly in raising difficulties as to messages sent by a coastguard officer. (P.C. 2172.)

He was further instructed to inform Mr. Kerr that not only the Admiralty but this Office had been seriously inconvenienced by his suspension of service on the telephone for four days in July last, and that such an occurrence, if again repeated, would lead to his dismissal. He is also to understand that he is to receive and transmit with proper promptitude all messages tendered to him by the coastguard officer, and that this is to be regarded as a regular part of his duty. (P.C. 2187.)

Reported—That Miss I. F. Baird had resigned her clerkship on the 30th ultimo.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. Warnings issued.

Summary.

| | | |
|---|---|---|
| A + B (successful) | - - - - | = 29 districts. |
| C (failures) | - - - - | = 2 districts. |

2. Gales experienced, but for which no Warnings were issued.

The depression which advanced over our Islands on the night of the 10th November proved to be much deeper than was anticipated, and the gale which was expected to blow on our south and north-east coasts only, became general. In the north-east of England and the south-west of Ireland the gale had set in before any warnings could be issued, and in the east of Scotland it had commenced on a portion of the coast, although some further increase of force took place after the cone was hoisted.

(Signed) Fredc. Gaster.

Telegraphic Branch,
November 18, 1891.

Read—A letter from Mr. Baillie stating that since last meeting four logs had been received, all of them being "excellent." Mr. Scott was instructed to express the best thanks of the Council to the observers.

**Submitted—The following report on the 8.30 p.m. forecasts for September 1891 :—**

**The letters used have the following signification :—**
**a**=complete success. | **c**=partial failure.
**b**=partial (*i.e.* more than half) success. | **d**=total failure.

| Districts. | | Per-centages. | | | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| | | Wind. | Weather. | Average Forecast. | |
| Scotland, N. | a | 27 | 40 | 34 | 74 |
| ,, | b | 33 | 47 | 40 | |
| ,, | c | 30 | 10 | 20 | |
| ,, | d | 10 | 3 | 6 | |
| Scotland, E. | a | 37 | 40 | 39 | 72 |
| ,, | b | 40 | 27 | 33 | |
| ,, | c | 10 | 27 | 19 | |
| ,, | d | 13 | 6 | 9 | |
| England, N.E. | a | 40 | 47 | 44 | 82 |
| ,, | b | 47 | 30 | 38 | |
| ,, | c | 10 | 10 | 10 | |
| ,, | d | 3 | 13 | 8 | |
| England, E. | a | 57 | 44 | 51 | 89 |
| ,, | b | 33 | 43 | 38 | |
| ,, | c | 10 | 13 | 11 | |
| ,, | d | 0 | 0 | 0 | |
| Midland Counties | a | 47 | 50 | 49 | 84 |
| ,, | b | 30 | 40 | 35 | |
| ,, | c | 20 | 10 | 15 | |
| ,, | d | 3 | 0 | 1 | |
| England, S. | a | 53 | 47 | 50 | 85 |
| ,, | b | 37 | 33 | 35 | |
| ,, | c | 10 | 13 | 12 | |
| ,, | d | 0 | 7 | 3 | |
| Scotland, W. | a | 40 | 53 | 47 | 80 |
| ,, | b | 37 | 30 | 33 | |
| ,, | c | 17 | 7 | 12 | |
| ,, | d | 6 | 10 | 8 | |
| England, N.W. | a | 40 | 47 | 44 | 85 |
| ,, | b | 40 | 43 | 41 | |
| ,, | c | 17 | 0 | 9 | |
| ,, | d | 3 | 10 | 6 | |
| England, S.W. | a | 40 | 33 | 37 | 67 |
| ,, | b | 27 | 33 | 30 | |
| ,, | c | 20 | 17 | 18 | |
| ,, | d | 13 | 17 | 15 | |
| Ireland, N. | a | 37 | 53 | 45 | 82 |
| ,, | b | 37 | 37 | 37 | |
| ,, | c | 16 | 3 | 10 | |
| ,, | d | 10 | 7 | 8 | |
| Ireland, S. | a | 23 | 33 | 28 | 70 |
| ,, | b | 40 | 44 | 42 | |
| ,, | c | 20 | 13 | 17 | |
| ,, | d | 17 | 10 | 13 | |
| Summary. | | | | | |
| British Isles | a | 40 | 44 | 42 | 79 |
| ,, | b | 37 | 37 | 37 | |
| ,, | c | 16 | 11 | 14 | |
| ,, | d | 7 | 8 | 7 | |

Submitted—The following report on the 8.30 p.m. forecasts for October 1891 :—

The letters used have the following signification :—
**a**=complete success. | **c**=partial failure.
**b**=partial (*i.e.*, more than half) success. | **d**=total failure.

| Districts. | | Per-centages. | | | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| | | Wind. | Weather. | Average Forecast. | |
| Scotland, N. | a | 43 | 57 | 50 | 82 |
| ,, | b | 33 | 30 | 32 | |
| ,, | c | 17 | 10 | 13 | |
| ,, | d | 7 | 3 | 5 | |
| Scotland, E. | a | 33 | 53 | 43 | 71 |
| ,, | b | 33 | 23 | 28 | |
| ,, | c | 24 | 17 | 21 | |
| ,, | d | 10 | 7 | 8 | |
| England, N.E. | a | 37 | 53 | 45 | 75 |
| ,, | b | 43 | 17 | 30 | |
| ,, | c | 17 | 17 | 17 | |
| ,, | d | 3 | 13 | 8 | |
| England, E. | a | 37 | 53 | 45 | 82 |
| ,, | b | 37 | 37 | 37 | |
| ,, | c | 23 | 7 | 15 | |
| ,, | d | 3 | 3 | 3 | |
| Midland Counties | a | 40 | 50 | 45 | 77 |
| ,, | b | 30 | 33 | 32 | |
| ,, | c | 23 | 10 | 16 | |
| ,, | d | 7 | 7 | 7 | |
| England, S. | a | 53 | 57 | 55 | 89 |
| ,, | b | 40 | 27 | 34 | |
| ,, | c | 7 | 10 | 8 | |
| ,, | d | 0 | 6 | 3 | |
| Scotland, W. | a | 40 | 54 | 47 | 69 |
| ,, | b | 20 | 23 | 22 | |
| ,, | c | 30 | 10 | 20 | |
| ,, | d | 10 | 13 | 11 | |
| England, N.W. | a | 40 | 63 | 52 | 90 |
| ,, | b | 40 | 37 | 38 | |
| ,, | c | 17 | 0 | 9 | |
| ,, | d | 3 | 0 | 1 | |
| England, S.W. | a | 27 | 63 | 45 | 89 |
| ,, | b | 60 | 27 | 44 | |
| ,, | c | 3 | 10 | 6 | |
| ,, | d | 10 | 0 | 5 | |
| Ireland, N. | a | 40 | 73 | 57 | 87 |
| ,, | b | 33 | 27 | 30 | |
| ,, | c | 17 | 0 | 8 | |
| ,, | d | 10 | 0 | 5 | |
| Ireland, S. | a | 23 | 50 | 37 | 79 |
| ,, | b | 47 | 37 | 42 | |
| ,, | c | 17 | 10 | 13 | |
| ,, | d | 13 | 3 | 8 | |
| Summary. | | | | | |
| British Isles | a | 37 | 57 | 47 | 81 |
| ,, | b | 38 | 29 | 34 | |
| ,, | c | 18 | 9 | 13 | |
| ,, | d | 7 | 5 | 6 | |

Mr. Scott reported that he had ascertained from Messrs. Few & Co. that they were satisfied that two of the mortgages on Westwood House had been cleared off, and that as to the third they expected to learn ere long that that too had been cleared, and that the title was perfect.

Mr. Scott was instructed to ascertain from Mr. Cullum how soon he could remove the observatory to Westwood House whenever he was instructed by the Office to do so. (P.C. 2119.)

He was further instructed, on receipt of Mr. Cullum's reply, to communicate with the Knight of Kerry as to continuing the tenancy of the present observatory for such time as might be necessary. (P.C. 2164.)

The Chairman stated (Letters 1551 and 1760) that he had received an estimate for proposed alterations, &c. at Westwood House, amounting to 161*l.* 15*s.* 11*d.*, and that he had authorised work to the amount of 80*l.* 3*s.*, leaving other items for the decision of the Council.

The Council instructed Mr. Scott to authorise the erection of a new tank at about 20*l.* and a new kitchen range at a cost, if possible, less than that quoted, viz., 30*l.* 9*s.* Electric bells were also authorised, the cost, if possible, to be reduced. (P.C. 2170.)

Submitted—The following reports of work during the month of October 1891 :—

MARINE BRANCH.

November 17, 1891.

Examined 9 new logs.

Engaged chiefly on the discussion of winds and sea temperatures for the district between the Cape of Good Hope and New Zealand. Further information has been obtained from the logs of men-of-war, and a few more private logs have been received. For the months of February, May, and August homogeneous wind areas have been arranged, and preliminary steps taken to ascertain the best method of representing the results in each area.

Charting currents in all oceans. During the month 200 logs of H.M. ships were received from the Public Record Office.

One member of the staff employed on the preparation of monthly sea temperature charts for the part of the North Atlantic lying between latitude 40° to 50° N., longitude 10° to 60° W.

Indexing data in ocean 10° squares.

A member of the female staff resigned at the end of the month.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(October 1891.)

*Monthly Weather Report*, 1881.

*Weekly Weather Report*, 1891.—All numbers issued promptly to date.

*Various Appendices to same.*—No. I., Part 3, in printer's hands. No. II. well up to date. Nos. III. and IV. awaiting decision of Council.

*Monthly Summaries.*—January, gone forward "for press." February, gone forward "for revise." March, in proof. April, being written. May to September, tables, &c. prepared.

*Daily Weather Report*, 1891.—All numbers issued to date, with monthly correction sheets to end of September.

*Primary Checking of Storm Warnings issued*, 1891.—Done to date.

*Primary Checking of Forecasts* (8.30 *p.m.*), 1891.—Done to date.

The staff are now nearly all back to regular duty, and as the issue of maps, remarks, &c. to the Royal Naval Exhibition ceases from this date, it is hoped that better progress will be made with the work of the Branch (other than routine work) than has been possible for several months past.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

October 31, 1891.

*Hourly Means.*—The revision of the proof sheets for the year 1888 is almost completed, and the volume will be ready for press in a few days. The calculation of the various mean values for 1889 is still in hand.

*Harmonic Analysis.*—A series of curves to accompany the tables recently prepared has been drawn, and other work done preliminary to the volume going finally to press.

*Miscellaneous.*—Some time has been occupied on tables to accompany Mr. Scott's paper on sunshine, and the usual routine work of the room has been kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

November 2, 1891.

*Examinations.*

*August* 1891.—Partially examined.

*September* 1891.—Partial examination of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents.

*General.*

*Diurnal Range of Rainfall,* 1880–1890.—Completing the extraction of the Hourly Values of Stonyhurst and Glasgow, 1884–1890, and totalling and copying into monthly and yearly forms.

Checking the daily maximum and minimum values and times of the barograph for all stations, August–October 1889.

Measurements and calculations *re* the determination of the Fort William barograph scale and thermograph scale and zero-line values proceeded with.

Various routine matters accounted for much of the time of the staff.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

*Hong-Kong Observatory.*—Observations. 1890.

*Gray, D.*—Report on new whaling grounds in the Southern Seas.

*Margate, Medical Officer of Health.*—Annual report on the health of Margate for the year 1890.

*Prague, K.K. Sternwarte.*—Magnetische und meteorologische Beobachtungen. 1890.

*Major, F.*—Spacial and atomic energy. Part iii. Heat.

*Neumayer, G.*—Über die Bedeutung und Ziele erdmagnetischer Landesvermessungen

*Montreal, Geological and Natural History Survey of Canada.*—Annual report. New series. Vol. iv. 1888–89.

*Perntner, J. M.*—Die Windverhältnisse auf dem Sonnblick und einigen anderen Gipfelstationen.

*San Fernando, Instituto y Observatorio de Marina.*—Anales. 1890.

*Riggenbach, A.*—Zur Wolken-Photographie.

*Ragona, D.*—Gli osservatorii meteorologici di montagna.

*Greenwood, W. N.*—Kludonometric tide tables. 1892.

*Magdeburg.*—Jahrbuch der meteorologischen Beobachtungen der Wetterwarte der Magdeburgischen Zeitung. 1890.

*Oliver, F. W.*—On the effects of urban fog upon cultivated plants.

*Baxendell, J.*—Abstract of meteorological results for the borough of Southport. Averages for the 19 years, 1872–90 inclusive.

*London, Admiralty.*—Tide-tables for the British and Irish Ports, for the year 1892.

*Elster, J., und Geitel, H.*—Ueber die Abhängigkeit der durch das Licht bewirkten Electricitätszerstreuung von der Natur der belichteten Oberfläche.

—— Ueber die Entladung negativ electrischer Körper durch das Sonnen- und Tageslicht.

—— Beobachtungen, betreffend die elektrische Natur der atmosphärischen Niederschläge.

—— Messungen des normalen Potentialgefälles der atmosphärischen Elektricität in absolutem Maasse.

—— Ueber einige Ziele und Methoden luftelektrischer Untersuchungen.

—— Elektrische Beobachtungen auf dem Hohen Sonnblick.

*Helsingfors, Institut Météorologique Central.*—Observations météorologiques faites à Helsingfors en 1890. Vol. ix. Livr. i.

—— *Finska Vetenskaps-Societeten.*—Öfversigt af Finska Vetenskaps-Societetens Förhandlingar. xxxii. 1889–90.

*Azambuja, G. A. de.*—Annuario do Estado do Rio Grande do Sul para o anno de 1892.

*Adelaide Observatory.*—Rainfall in South Australia and the Northern Territory during 1890; with weather characteristics of each month.

63, *Victoria Street, December* 2, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (November 18) were read and confirmed.

Read—Letter 2157 from the Coastguard Office (Minutes, p. 46), thanking the Council for the action taken *re* the telephone at Mullaghmore.

Read—Letter 2183 from the Colonial Office accepting the proposals as to supply of instruments for St. Helena made by the Council (Minutes, p. 46). Mr. Scott reported that the instruments had been forwarded for shipment by the "Arab" on the 4th instant.

Reported—That observations for the period of 16 months, February 1890 to July 1891, had been received from Malden Island in the Pacific, lat. 4° S. (Minutes 1889, p. 51).

The following circular (Minutes, p. 46) was approved, and the Secretary was instructed to issue it:—

(Enclosure.)

(M.O. 1050.)

SUPPLY of PUBLICATIONS.

I AM directed by the Meteorological Council to inform you that they have resolved to limit the gratuitous supply of their publications to Institutions and persons likely to make use of them or to facilitate their use by others.

The publications which you have been in the habit of receiving are specified on the accompanying form, and I have now to request that you will be good enough to fill up and return the same so as to indicate which of these publications you wish to receive in future, and the extent to which you anticipate that the publications you ask for may be utilised by yourself or through your means.

If no reply is received to this circular it will be assumed that you do not wish the issue of the publications hitherto supplied to you to be continued, and their despatch will cease.

Mr. Scott reported (Minutes, 1888, p. 79).—That the calculation of the mean hourly monthly results for all the observatories had been now completed for the period from 1874 up to date, being the entire period for which the hourly values had been either lithographed or printed. There still remained five years, 1869—1873, for which the values existed only in the tabulation forms, and these required copying before their calculation could be effected.—The copying of these figures was authorised.

Read—A letter from Mr. Whipple, accompanying a Report on Cloud Photography at Kew Observatory.—Referred to General Strachey.

Professor Darwin communicated some correspondence which he had had with Mr. Dines as to the anemometer experiments (Letter 2208) (Minutes, p. 30).

Read—Letter 2166 from Lloyd's (Minutes, p. 46) authorising the Office to enter into direct correspondence with their observer at the North Foreland.

Read—A letter from Mr. Baillie reporting that since last meeting 9 logs had been received, four of them being "excellent."

Mr. Scott was instructed to present the charts (O. 27) to Captains Richardson Bell and W. Peterkin, and to convey the best thanks of the Council to the other observers.

Reported—That Miss Augusta E. Mansford had been engaged as a clerk from the 30th ultimo, at the salary of 12*s.* 6*d.* per week, rising to 1*l.* according to proficiency, as in previous cases (Minutes, 1890, p. 64).

Resolved—That the usual bonus of 3*l.* 3*s.* be given to those of the telegraphic reporters who have discharged their duties satisfactorily during the year (Minutes 1890, p. 67).

Mr. Stone was appointed to act as auditor for the present year.

Submitted—The following reports on work during the month of November 1891 :—

MARINE BRANCH.

December 2, 1892.

Examined 10 new logs.

Extracting such information as can be obtained from the logs of men-of-war and the steamships of private firms entering the district between the Cape of Good Hope and New Zealand. Preparing sea-temperature means, and grouping the winds in homogeneous areas. Several kinds of wind-roses drawn for a number of areas as specimens for deciding upon the mode of representing the final results.

For charting the currents in various oceans 440 logs of H.M. ships were received from the Public Record Office during the month. The logs lent by private firms for the Cape to New Zealand district are also utilised for the current work.

Indexing data in ocean 10-degree squares.

The vacancy on the female staff occasioned by a resignation at the close of October has now been filled up, the new member entering upon her duties on November 30.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To November 30, 1891.)

*Weekly Weather Report.*—All numbers issued promptly.

*Appendix I.*, Part III., issued.

*Supplement.*—Monthly Summaries, January, February, March, all issued; April, in revise; May partly written; June, almost complete. Other months well in hand (tables, &c., prepared).

*Daily Weather Report.*—All numbers issued promptly. Corrections and additions for October issued.

*Primary Checking of Storm Warnings*, 1891.—Done to date.

*Checking of Forecasts* (8.30 p.m.).—Done to date.

*Plotting of Rainfall Stations* (Symons, 1866–90) on new Maps.—Done and handed in.

*Examination of Inspection Notes*, 1891, for Telegraphic Reporting Stations.—Report for English Stations ready, and Inspector has been seen.

Every effort is now being made to bring the Monthly Summary of W. W. Report up to date, and arrears are being rapidly overtaken.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

December 2, 1891.

*Hourly Means.*—The revision of the proofs of the tables for 1888 completed, and the volume signed for press. The calculation of the various means for the year 1889 has made good progress.

*Harmonic Analysis.*—The proofs of the introduction to this work have been revised, and the volume is now ready for press.

*Miscellaneous.*—The sunshine cards for the past 10 years have been re-arranged in new cupboards prepared for them, and the usual routine work of the Room kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S., &c.

EXAMINATION BRANCH.

December 1, 1891.

*Examinations.*

*August* 1891.—Completed with the exception of the Kew thermograms, not yet received.

Weekly examination (on receipt) of curves and documents from all observatories.

*General.*

*Diurnal Range of Rainfall*, 1880–1890.—Completed.

Checking the *Daily Maximum and Minimum* values and times of the barograph curves for all observatories, October–December 1889.—Completed.

Preparing *Diary of Operations*, 1892, and correcting proof of same.

(Signed) T. E. ALLEN.

**Submitted—The following report on the 8.30 p.m. forecasts for November 1891 :—**

**The letters used have the following signification :—**

**a**=complete success.
**b**=partial (*i.e.* more than half) success.
**c**=partial failure.
**d**=total failure.

NOVEMBER.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 40 | 55 | 48 | 80 |
| ,, | b | 30 | 35 | 32 | |
| ,, | c | 10 | 7 | 9 | |
| ,, | d | 20 | 3 | 11 | |
| Scotland, E. | a | 33 | 48 | 41 | 65 |
| ,, | b | 27 | 21 | 24 | |
| ,, | c | 30 | 24 | 27 | |
| ,, | d | 10 | 7 | 8 | |
| England, N.E. | a | 33 | 50 | 42 | 79 |
| ,, | b | 44 | 30 | 37 | |
| ,, | c | 23 | 10 | 16 | |
| ,, | d | 0 | 10 | 5 | |
| England, E. | a | 33 | 50 | 42 | 79 |
| ,, | b | 44 | 30 | 37 | |
| ,, | c | 13 | 20 | 16 | |
| ,, | d | 10 | 0 | 5 | |
| Midland Counties | a | 40 | 43 | 42 | 63 |
| ,, | b | 23 | 20 | 21 | |
| ,, | c | 17 | 37 | 27 | |
| ,, | d | 20 | 0 | 10 | |
| England, S. | a | 37 | 50 | 44 | 82 |
| ,, | b | 43 | 33 | 38 | |
| ,, | c | 17 | 17 | 17 | |
| ,, | d | 3 | 0 | 1 | |
| Scotland, W. | a | 40 | 47 | 44 | 79 |
| ,, | b | 27 | 43 | 35 | |
| ,, | c | 30 | 7 | 18 | |
| ,, | d | 3 | 3 | 3 | |
| England, N.W. | a | 50 | 53 | 52 | 75 |
| ,, | b | 13 | 33 | 23 | |
| ,, | c | 24 | 7 | 15 | |
| ,, | d | 13 | 7 | 10 | |
| England, S.W. | a | 33 | 57 | 45 | 75 |
| ,, | b | 33 | 27 | 30 | |
| ,, | c | 10 | 10 | 10 | |
| ,, | d | 24 | 6 | 15 | |
| Ireland, N. | a | 30 | 57 | 44 | 74 |
| ,, | b | 27 | 33 | 30 | |
| ,, | c | 27 | 7 | 17 | |
| ,, | d | 16 | 3 | 9 | |
| Ireland, S. | a | 30 | 60 | 45 | 67 |
| ,, | b | 20 | 23 | 22 | |
| ,, | c | 23 | 7 | 15 | |
| ,, | d | 27 | 10 | 18 | |

SUMMARY.

| | | | | | |
|---|---|---|---|---|---|
| British Isles | a | 34 | 52 | 44 | 74 |
| ,, | b | 30 | 30 | 30 | |
| ,, | c | 21 | 14 | 18 | |
| ,, | d | 13 | 4 | 8 | |

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

(1.) WARNINGS ISSUED.

*Summary.*

| | | | | | | |
|---|---|---|---|---|---|---|
| A + B (successful) | - | - | - | - | = | 14 districts. |
| C (failures) | - | - | - | - | = | 7 districts. |

(2.) GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None; but a fresh Southerly gale was experienced at two or three of our western stations on the night of the 27th, and in the Straits of Dover on the evening of the 1st December; for these no warning was issued.

Telegraphic Branch, (Signed) FREDC. GASTER.
December 2, 1891.

Submitted—The following list of publications which had been received since the last meeting :—

*Abbe, C.*—A relation between meteorology and the grasshopper or locust pest.
—— The Signal Service Bibliography of meteorology.
—— Observations on the total eclipse of the sun of 1869.
—— Annual report of the Director of the Cincinnati Observatory, June, 1870.
—— Remarks on the selection of a prime meridian.

*São Paulo.*—Boletim da Commissão Geographica e Geologica do Estado de S. Paulo. N. 6. Dados climatologicos do anno de 1889 por A. Loefgren.

*Frankfurt am Main, Physikalischer Verein.*—Jahresbericht für das Rechnungsjahr 1889–90.

*Tokio, Meteorological Central Observatory.*—Monthly Summaries and monthly means for the year 1889.
—— —— Annual meteorological report. 1888, Part ii.; 1889, Parts i. and ii.; 1890, Parts i. and ii.

*Washington, Weather Bureau.*—Special report of Chief of the Weather Bureau to the Secretary of Agriculture, 1891.

*St. Petersburg, Kaiserl. Russische Geographische Gesellschaft.*—Beobachtungen der Russischen Polarstation auf Nowaja Semlja. I. Theil. Magnetische Beobachtungen.

*Colombo, Surveyor-General's Office.*—Report on the meteorology of Ceylon for 1890.

*Calcutta, Meteorological Office, India.*—Indian meteorological memoirs. Vol. iv. Part vii.
—— —— Monthly weather review. 1891. Jan.–April.
—— —— Report on the administration of the Meteorological Department of the Government of India in 1890–91.

*Peking, Inspectorate General of Customs.*—Medical reports for the half-year ended 31st March 1889.

*Hopkinson, J.*—Water and water-supply, with special reference to the supply of London from the chalk of Hertfordshire.

*London Meteorological Office.*—Hourly means of the readings obtained from the self-recording instruments at the four observatories under the Meteorological Council, 1888.

*Strachey, R., and Whipple, G. M.*—Cloud photography conducted under the Meteorological Council at the Kew Observatory.

*Paris, Comité International des Poids et Mesures.*—Quatorzième rapport aux Gouvernements Signataires de la Convention du mètre sur l'exercice de 1890.

*Marseilles, Commission de Météorologie du Département des Bouches-du-Rhone.*—Bulletin Annuel. 1890.

*Paris, Bureau Central Météorologique.*—Annales. 1889. i.–iii.

*Bombay Government Observatory.*—Report on the condition and proceedings of the Government Observatory, Colaba, for the year which ended with the 30th June, 1891.

*Whymper, E.*—How to use the aneroid barometer.

63, *Victoria Street, December* 16, 1891.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. GALTON. |
| PROFESSOR DARWIN. | MR. STONE. |

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 2) were read and confirmed.

Read—Letter 2228 from Mr. R. Fitzgerald, agent to the Knight of Kerry, allowing the Council to continue the tenancy of the observatory, Valencia Island, for six months from December 1, 1891 (Minutes, p. 41).

Mr. Scott was instructed to convey the thanks of the Council to Mr. Fitzgerald. (P.C. 2327.)

Mr. Buchan submitted the following memorandum on the subject of a continuation of the publication of British Rain Means (Minutes, p. 46):—

RAINFALL STATISTICS for the BRITISH ISLANDS.

IT is not to be hoped that we shall ever be in possession of observations covering the same 25, or even 20, years, from a sufficient number of well-distributed stations, to give a fairly approximate comparison, for the different districts of these Islands, of their climates as regards pressure, temperature, humidity, and rainfall. As concerns pressure, temperature, and humidity, however, fairly approximate comparisons may be obtained by the actual means for the 25 years for the places at which observations have been continuous for the period, these being supplemented by means for the same period, obtained by differentiation, for those places at shorter periods than the 25 years.

This is rendered possible by the circumstance that the differences in the mean pressure, temperature, and humidity for any particular month proceed equably from one district to the districts immediately surrounding it; so that it becomes easy to interpolate, with very considerable accuracy, the means for any particular place from the observed means at places surrounding it.

It is quite otherwise with the rainfall. As regards this element of climate, in a very large number of cases, forming the majority of cases, only loose approximations of an extremely unsatisfactory character can be made by any process of differentiation to the actual rainfall for any particular month at a place where no observations of the rainfall for that month have been made. This arises, of course, from the well-known capricious manner in which the rainfall is partitioned over places contiguous to each other.

In 1882 the Council published monthly rainfall returns for the 15 years 1866–1880, which were prepared by Mr. Symons. This period is too short for trustworthy monthly averages. Mr. Symons has furnished a list of the stations in that report from which returns may be supplied by him for the past 10 years, thus affording returns for a large number of places continuously month by month for the past 25 years.

On marking these in their places on a map of the British Islands, it is seen that not more than a third part of Scotland, Wales, and Ireland is, in each case, represented. A supplementary number were added of stations, now existing, to be substituted for those stations at which rainfall observations had ceased to be made. The Council were, however, of opinion that, from a comparison made, the proposed new stations could not be accepted in room of those at which observations had lapsed. Thus the attempt to represent adequately the mean monthly rainfall of the British Islands by a selected number of stations, from which monthly amounts are available for the same 25 years, has broken down.

It has, however, been found that on the whole good averages may be obtained from 25 years' observations, and of course still better for longer periods, even though these years be not the same years for the different places compared.

If the Council should resolve to publish a series of tables from which approximately good averages of the monthly rainfall may be calculated, it can only be on the method now suggested. It is believed that the object may be substantially gained if the statistics covered any 25 years, or longer, from 1831 to 1890. In carrying out this scheme, it is above all indispensable that the selected stations be as well distributed as possible.

To the above, an exception will require to be made, seeing that considerable important districts must remain unrepresented, if no shorter period than 25 years' observations be accepted. In such cases, but only in such cases, it might be suggested that, say 19 years' periods may be included in

the collection of rain statistics. The districts here referred to are, in almost all cases, those which are characterized by a large rainfall.

The returns may include places at which no returns may be available for one month, or for a longer period, owing to an interruption in making the observations. These should be sent to the Office as blanks, no interpolations being in any case allowed. If it should be ultimately resolved to resort to interpolations in the printed tables, these should be made in the Office on some uniform method sanctioned by the Council.

The returns should be arranged into periods of five years, separated for the sake of clearness by blank lines, the lustra chosen being in accordance with the recommendations of the Meteorological Congresses. At most only one average need be sent to the Office, viz., the monthly and annual means of all the observations supplied by the individual station.

Considering the importance in several inquiries of having rain statistics going as far back as possible, an effort might be made to include in the returns monthly amounts of rain, as far back as trustworthy observations are available, which observations extend over years or longer.

In carrying out this scheme, perhaps the first step might be to communicate with those who are known to be in possession of the information required, and ascertain the stations whose observations they could place at the disposal of the Council. A small map showing the positions of these stations might also be sent.

## Submitted—The following reports—

### Report of Inspection of the Irish and Welsh Stations.

#### Telegraphic Reporting Stations.

*Holyhead,* visited July 25th.—The station is fairly satisfactory. The observer does not read the thermometers quite correctly as regards tenths of degrees. The rain-gauge required some slight repairs, which were ordered to be effected.

*Roche's Point,* visited July 28th.—The observations are very well taken. The thermometers were not clean, but there had been much dust about, from building, and the weather had been very dry.

*Valencia,* visited July 31st.—The station calls for no remark as to the observations. I saw the builder about Westwood House, and gave instructions as to alterations, as authorised by Council. I directed builder to send in estimate for internal repairs and decorations to dwelling-house.

*Parsonstown,* visited August 4th.—The observer Haines is quite efficient, and the station is in good order.

*Malin Head,* visited August 11th.—The observer was absent, but his assistant, a very smart boy from Brow Head signal station (co. Cork), had learnt the duty of reporting very well.

*Mullaghmore,* visited August 11th.—The station is, as usual, in very good order. The observer wishes to be supplied with a self-recording aneroid, if possible.

*Belmullet,* visited August 13th.—This station calls for no remark; it is satisfactory so far as is possible at such a place.

*St. Anne's Head,* visited December 9th.—I found this station in good order, as usual. There is a prospect of a change of observer, as the present man expects promotion.

#### Weekly Weather Report Stations.

*Killarney,* visited July 29th.—This station calls for no remark.

#### Stations of the Second Order.

*Dublin, Glasnevin,* visited July 27th.—This station was as usual in very good order. The observer is careful.

*Dublin, Phœnix Park,* visited July 27th.—The station was in perfect order, but the observer was unfortunately absent. I saw the substitute, who is the former observer.

*Dublin, Fitz William Square,* visited July 27th.—This station was, as usual, in perfect order. The thermometer and rain-gauge are not well exposed, as the garden is very confined.

*Parsonstown,* visited August 4th.—There is a new observer, Perry, a national school teacher. He seems to be efficient; he has only recently began work.

*Lissan, Co. Tyrone,* visited August 5th.—Sir N. Staples has procured new instruments in place of those noted as defective on last inspection. The observations are very carefully taken.

*Armagh,* visited August 5th. — At this station there is constant discrepancy between the Beckley and the ordinary gauge, which Dr. Dreyer is endeavouring to explain. He is going to try the effect of moving the ordinary gauge to a greater distance from the Beckley gauge, and therefore further out into the field.

*Colebrooke,* visited August 6th.—The station is in good order, but the observer is not careful enough about observing the weather in the intervals between the observations.

*Londonderry,* visited August 7th.—The station is satisfactory except as regards the position of thermometers and rain-gauge, but the only site available is a town garden.

*Markree,* visited August 12th.—This station is satisfactory. The assistant observer is shortly to be changed.

*Currygrane*, visited August 17th.—At this station the observer is new. He seems to read correctly, but I discovered some carelessness in entries. I hope that the notice taken will be sufficient to ensure care in future.

*Arley Cottage*, visited August 18th.—This is a new station; Major Somerset Maxwell has equipped it in a very complete manner. It is very good, and Major Maxwell has trained his assistant well.

*St. David's*, visited December 8th.—The station is in perfect order.

*Tenby*, visited December 10th.—This is a new station. The instruments have been procured by the Town Council, and the observer, Mr. Gower, is a local schoolmaster. The exposure in his garden is not good, as no grass is available. He takes his wind and weather reports from the C.G. log, and the sunshine recorder is on the Castle Hill in charge of the Coastguard.

Mr. Gower himself is very zealous, and I hope that he may improve the position of his instruments.

ROBERT H. SCOTT.

| Stations. | Dry Bulb. | Wet Bulb. | Max. | Min. | Spare Ther. | Remarks. |
|---|---|---|---|---|---|---|
| **Telegraphic Reporting Stations.** | | | | | | |
| Holyhead | −0°·1 | −0°·3 | −0°·5 | +0°·2 | −0°·4 | |
| Mullaghmore | 0·0 | −0·2 | −0·2 | +0·3 | −0·5 | |
| Malin Head | −0·2 | −0·2 | −0·2 | −0·1 | −0·3 | |
| Belmullet | −0·4 | −0·1 | 0·0 | −0·4 | — | No spare ther. |
| Donaghadee | — | — | — | — | — | Not inspected this year. |
| Parsonstown | −0·7 | +0·1 | −0·4 | +0·3 | — | No spare ther. |
| Roche's Point | −0·5 | −0·7 | −0·3 | −0·7 | — | Do do. |
| Valencia | −0·6 | −0·6 | −0·3 | 0·0 | — | |
| St. Ann's Head | −0·2 | −0·1 | −0·1 | −0·2 | −0·2 | |
| **Weekly Weather Report Stations.** | | | | | | |
| Londonderry | −0·1 | −0·1 | 0·0 | +0·1 | — | |
| Killarney | −0·1 | −0·2 | −0·1 | +0·2 | — | Min. ther. sluggish; bulb large. |
| Foynes | Not inspected this year. | | | | | |
| Waterford | | | | | | |
| Kilkenny | | | | | | |

## Stations of the Second Order, 1891.

Corrections to be applied to readings of—

| Stations. | Dry Bulb. | Wet Bulb. | Max. | Min. | Spare Ther. | Remarks. |
|---|---|---|---|---|---|---|
| Armagh | −0°·2 | −0°·2 | −0°·9 | — | — | Grass min. +0·9. |
| Brookeborough | −0·5 | −1·0 | −0·2 | −0·1 | — | |
| Dublin (City) | −0·5 | −0·5 | −1·0 | 0·0 | — | |
| Dublin (Phœnix Park) | −0·2 | −0·2 | −0·2 | +0·4 | −0·4 | Do. +0·2. |
| Edgeworthstown | −0·7 | −0·6 | −0·6 | +0·1 | — | Do. −0·1, Kew standard −0·5. |
| Glasnevin | −0·4 | −0·4 | −0·7 | +0·5 | — | Do. +0·1. |
| Lissan | −0·1 | −0·1 | −0·1 | +0·3 | — | |
| Londonderry | −0·1 | −0·1 | 0·0 | +0·1 | — | |
| Markree Castle | −0·1 | −0·1 | 0·0 | +0·4 | — | Kew standard −0·1. |
| Mount Nugent | −0·1 | −0·1 | +0·9 | 0·0 | — | Grass min. +0·5. |
| Parsonstown | −0·7 | +0·1 | −0·5 | +0·3 | — | Do. +0·5. |
| St. David's | −0·3 | −0·5 | +0·4 | 0·0 | — | Do. −0·1. |
| Tenby | −0·1 | 0·0 | +0·1 | +0·2 | — | Do. +0·1. |

## Report of Inspection of the English Stations, 1891.

At the stations visited by me this year the thermometers employed were, as before, Negretti's and Zambra's Nos. 13516 and B.T. 3158. These instruments have been once annually tested by me before use, and twice tested in 1891 (on the last occasion by Mr. Whipple and myself at Kew on November 23rd). It is not a little remarkable that the negative corrections applicable to No. 3158 have annually increased up to the present date, although the increase is now extremely slow; and in No. 13516 it was only in 1889 that the index error became stationary. During inspection tours the corrections determined in the early part of each year have been employed. Although I took the greatest care in comparing the instruments at the stations, I do not feel very well satisfied with the aspect of the results of the thermometer comparisons shown in the Table. I shall be very grateful if the Council consent to allow me in 1892 the use of a Kew standard in place of one of the thermometers above mentioned, the other being then returned to the Meteorological Office.

## Telegraphic Reporting Stations.

*Jersey*, August 10th–13th.—The instruments at St. Aubin's were all in excellent order. The thermometer screen has been thoroughly repaired. I consider the reports from this station to be very good.

Considerable difficulty had arisen with regard to the continuation of the records of bright sunshine at Jersey.

Since the removal of the recorder to Fort Regent, where its exposure is perfect, the instrument has been attended to by some of the pensioners at the Fort, who have been paid for this work by the harbour-master. The Harbour Board having declined to defray his expense in this matter, I applied to General Ewart, C.B., Lieutenant-Governor of the Island, who received my request with much kindness, and who has since obtained from the bailiff of Jersey a copy of an Act of the Committee of the Defence of the Island, authorising the payment of 1*l.* for the present year as salary to the men who attend to the sunshine cards. The Lieutenant-Governor has also promised to make an application for the same sum at the end of 12 months.

In any event the sunshine records at Jersey will not have to be dropped.

*Hurst Castle*, August 16th.—All the instruments at this station were found to be clean and in good order. The minimum thermometer gave somewhat high readings, and the wet-bulb has never been correctly fastened to the porcelain; the observer always takes his readings from the degree-lines on the glass, but it may be desirable that the instrument should be changed. The thermometers are read somewhat roughly by Mr. Appleton, but, so far as I have observed, he takes the readings of the barometers with entire accuracy.

I have in previous years mentioned the impossibility of getting a fair estimate of sea disturbance in rough weather at this station; and I may add that when a sea of "5" is reported with Westerly winds from Hurst Castle, a disturbance of "6" may generally be anticipated in mid-channel. The force of the winds reported from this station may be taken as roughly representing the wind-force about the middle of our south coast, but the direction is locally influenced by certain topographical features.

*Scilly* (*St. Mary's*), August 19th and 20th.—The reports from this important station have improved with the increased experience of the observer, but I regret to say that he has hitherto failed in telegraphing extreme readings of the self-registering aneroid, which are of considerable value in the case of disturbances advancing from the south-west.

The duration of gales which arise or subside in the night is a sore subject with observers who are unable to study the anemograph. I found the anemometer at this station in good order, but I must admit that there is some difficulty in changing the paper during a gale, especially if the latter is accompanied by rain, a difficulty not appreciated by those unaccustomed to the task.

The observer reads barometers and thermometers quickly and accurately. I feel sure that there is no one else in St. Mary's who could undertake the whole work so well.

*Prawle Point*, August 23rd.—The observations at this station are good; the observer and his assistants read the instruments very correctly, and all the instruments were found by me in excellent order. The maximum thermometer read 0°·6 too low (uncorrected). No difficulty has been experienced during the past year with the minimum.

*Dungeness*, August 28th.—The readings of all the instruments, as taken in my presence, with care that they should be taken independently, were thoroughly satisfactory. Yet it is certain that the barometric readings reported are occasionally faulty, the errors being probably clerical, or being occasioned by mistakes made between an observer coming on watch and one leaving duty. I called special attention to this carelessness. I found half of the bulb of the wet-bulb thermometer immersed in the water kept in the glass, the glass having been needlessly raised on a piece of wood since my last inspection, probably just before my arrival this year, and having been completely filled. This proved great want of intelligence on the part of the observers, to whom I gave such instructions as were necessary on the hygrometrical observations.

I think that the estimates of wind-force and of sea-disturbance at this station (*e.g.*, the extreme force 10 on the day of my visit) are quite correct.

*Liverpool* (Bidston Observatory), September 17th.—I think that the observations at this station are carefully taken, and the reports continue to be satisfactory. The old corrections of the thermometers require no change. The barometric readings reported are now taken from the large standard, a somewhat magnificent instrument, whose readings differed by only ·001 from the Adie's tube formerly in use.

*North Shields*, September 19th.—The observer was not on duty at the time of my visit. I found the instruments in their usual order; that is to say, the wet-bulb is very dirty, and the glass coated with metallic copper, while the other instruments are well attended to. The peculiar foulness of the air characteristic of this station is perhaps not so much due to collieries as to the smoke issuing from the factories in South Shields, and to the vomiting of immense quantities of the products of imperfect combustion from the steamers in the Tyne.

The instruments appear to be well read, and the reports to be promptly sent in.

*York*, September 19th.—Inaccuracy is still noticed in the barometer readings reported from this station. The observer read the instrument correctly at the date of my visit; and possibly his occasional carelessness takes the form of that unpunctuality of which I have formerly complained. As much as 2°·9 of spirit were found in the upper end of the minimum. It seems extraordinary

that the observer, who had for some time, as he stated, noticed the lowness of the readings, had not detected the detached spirit, visible at a distance of 3 or 4 yards. The continuity of the column was restored by one swing of the arm.

As I have previously reported, the station is inconveniently situated for observations of the wind.

*Cambridge,* October 26th.—Mr. Todd was again absent at the time of my visit. All the instruments were found to be in excellent order, as usual at this station.

*Yarmouth,* October 27th.—I found the instruments at this station to be all in good order. The anemograph is at present satisfactory, but I think that the instrument will have to be taken down and repaired in the course of the next 10 or 12 months, at the latest. On the evening of the 26th and morning of the 27th the observer, Mr. Watson, was entirely occupied in providing for a ship-wrecked crew, so that I could not compare his readings with my own, or indeed have any conversation with him.

*Loughborough,* November 10th.—The observer has removed to 9, Forest Road, a position almost entirely outside the town, having gardens and open ground towards the north and west. The position is decidedly more favourable than that formerly occupied in Victoria Street, the garden being larger, the walls much lower, and there being no trees or obstructions in the immediate vicinity of the instruments. I have sent a small plan of the garden, which is a strip of ground running N.W. from the observer's house. The observer was occupied during the time of my visit. All the instruments were, as usual, in the most perfect order.

## Second Order and Weekly Weather Reporting Stations.

*Parkstone,* August 24th.—This is a new second-order station. The observer, Mr. R. Hawkesworth Barnes, a gentlemen of long experience in meteorological observations, employs a large assortment of instruments. The returns received are excellent, and the register kept by the observer, on the old system, of the amount and forms of cloud is more full and minute than any which I have met with elsewhere. The instruments are 199 feet above sea-level. The thermometers and rain-gauges are in a garden surrounded by the thick pines characteristic of the neighbourhood; to the cutting off of the wind by which the sharp ground-frosts noticed here are perhaps due. An anemometer is in use, but is necessarily much sheltered. All the instruments were in most excellent order.

*Totland Bay, Isle of Wight.*—The weather did not permit of my crossing the Solent at the time of my visit to Parkstone, Swanage, &c. The observer, Mr. Dover, informs me that he will have no difficulty in taking the 9 p.m. observations (hitherto not received from this new station), except in the summer season when he lets his residence, and may have a difficulty in getting the instruments attended to.

*Leeson* (*Swanage*), August 25th.—This is also a new station of the second order. It stands in wooded and undulating country, which on account of the weather could not be satisfactorily surveyed. The observer, Mr. H. Stillwell, was unfortunately absent from home on the day of my visit, and, except by comparison of instruments, I could obtain no information whatever. All the instruments were in good order, and their readings gave satisfactory results. The rain-gauge is well exposed. The Stevenson's screen is sheltered by trees in the afternoon. The station promises well.

*Eastbourne,* August 26th.—No alterations have been made here since my inspection in 1890. All the instruments were found to be in good order, with the exception of the rain-gauge, the injuries to which, owing to the stones thrown at it, had become very serious. A new gauge which I examined, and found to be a good instrument, was ready for erection, while a strong external iron case was being constructed for it; the instrument has since been put in position. It will be well that the rim should still stand only 6 inches above the ground.

The station, as previously reported, is a good one.

*St. Leonards,* August 27th.—This station has improved in one respect since it was visited in 1890, viz., the evening observations were recommenced in January. The observer read the thermometers well, but the barometer (through careless adjustment of the fiducial) incorrectly.

The wet-bulb was in a very dirty state. I removed the muslin and gave instructions to the observer.

*Liverpool,* September 17th.—I had not until now inspected this station as one of the second order. All the instruments, which include the Osler's anemometer, double windmill vanes, and the Robinson's cup-anemometer (the centres of whose 8-inch diameter cups move through 15 feet in each revolution) are kept in admirable order. The rain-gauges are unavoidably sheltered to a slight extent by the observatory buildings. The station, it need hardly be said, is an excellent one.

*Seaham,* September 18th.—Unfortunately, Mr. Aird was ill at the time of my visit, so that I could not give some instruction which was desirable as to the saturation columns in the Hygrometrical Tables. The assistant observer continues to be careful and attentive, except in the treatment of the wet-bulb, which was foul with copper salts, while the glass of the bulb itself has, like that at Shields, a deposit of metallic copper.

There is, I think, no doubt that the maximum readings at this station now require a larger correction than that hitherto applied.

*York*, September 19th.—It would, I think, be desirable if there could be another Stevenson's screen at this station. The instruments for the telegraphic reports and for the 9 o'clock readings are so crowded as to be somewhat difficult of manipulation; and, further, when they are read instantaneously on opening the screen, the readings of those near the roof of the screen differ from the readings of those near the floor, comparisons thus made being unsupported by comparisons of the instruments in water.

*Sheffield*, September 19th.—The instruments at this station are all in good order, and the station would form an excellent one of the second order if 9 p.m. observations could be obtained, which they cannot. There is a very good site for a sunshine recorder on the roof of the Art Gallery, and Mr. Howorth would have one established here if required.

*Sudbury*, October 27th.—The observers were absent for some days from home, and I obtained no information about the instruments. It is at present doubtful whether a second-order station can be established here, although one is much wanted in this neighbourhood. The observers, Messrs. Rawson, are solicitors in Sudbury. They have undertaken to decide in a short time whether they will carry out the work.

*Ketton Hall*, October 28th.—This weekly weather reporting station is no longer under the immediate superintendence of Mr. Coventry, who left Ketton Hall in the year when the station was inspected by Captain Toynbee, and who has since lived at some miles' distance. The country round is undulating or moderately hilly. A sheet of artificial water borders on the south side the large garden sloping down towards it, in which the outdoor instruments are kept; and this may partly account for the lowness of the temperatures experienced on clear winter nights at this station. The altitude of the ground above mean sea-level is 130 feet. The observations are taken by the head gardener, Mr. W. H. Divers, a most intelligent man, who has taken for many years great interest in weather observations, constructing barograms and thermograms from three-hourly eye observations. It will be seen from the Table that the corrections hitherto applied to the dry-bulb and to the minimum require considerable modification.

*Rugby*, November 9th.—The observations made at this station scarcely appear to me capable of so much improvement as to make the returns available for publication. Two of the masters and one of the boys undertake the observations in term time; but the work falls, *ipso facto*, upon Mr. Kirk, the gardener at the observatory gardens, who takes the readings rather roughly, and whose diligence does not bestow upon him the power of making correct observations of wind and weather. Evening observations of the barometer are not sent and are rarely taken. The instrument will never be of any use in its present position, on the wall of a dark and draughty passage leading from the school quadrangle to some lecture rooms. The surface of the mercury in the cistern had become much coated, and I lost a little mercury in attempting to clean it, the whole case of the instrument being rust-bound. I would suggest that alterations in the care and position of the instruments should be made by application to the school authorities.

*Tealby (Market Rasen)*, November 11th.—I have hopes that this will be a useful second-order station. The observer read the instruments correctly, and takes interest in the work; his time, however, appears to be much occupied in other duties. He has suffered from illness during the spring and summer, and has only commenced sending in returns in July last. As mentioned in my last year's report, the situation of the thermometer screen is not unexceptionable. At the date of my visit, during the storm prevailing at the time, there was a leakage in the roof of the screen, causing the dry bulb to give inaccurate readings; this I ordered to be immediately remedied. There is no good situation for the rain-gauge (an unverified instrument, which, however, appeared to give accurate measurements) to be found on the observer's ground. I still think that the rainfall records should be obtained from the instrument kept by Mr. Jevons at Market Rasen, if such an arrangement can be made.

*Sutton Coldfield*, November 14th.—As at the last-mentioned station, the observer has suffered greatly in health from the results of influenza in the spring, and has been obliged to leave all the work of observation to his clerks at the Borough Surveying Office. The returns are very much in arrear; and I regret to say that the station will have to be dropped unless the Meteorological Office will undertake the hygrometrical reductions. The instruments were all in good order. The observer's business precluded him from taking readings with me, although I had selected a Saturday afternoon for my visit. His nephew, who is learning to take the readings, did not set the barometer correctly.

I think that if the assistance above mentioned can be given to the observer the returns will, after this visit, improve, and there is no reason why the station should not be a permanent one.

*Chilworth*, November 24th.—The observer, Mr. C. Bell, was absent at the time of my visit, and there was no one on the premises able to show me the barometer. The thermometer screen I found to be placed on sandy earth instead of on turf. The thermometer read correctly. The wet-bulb was not quite correctly mounted; and on this point I left a note, to which the observer has since promised to attend. These instruments are a good deal sheltered by the house. The rain-gauge, on the other hand, has a complete exposure, but it consists of a mere funnel placed on a glass bottle, which was greatly inclined, and I had no access to the measuring-glass. The house stands on a moderate eminence, in rather richly wooded and undulating country.

*Epsom*, November 25th.—The former observer, Mr. Jackson, succumbed to typhoid fever in the vacation, and his successor has recently left the College. Mr. Mayo, together with another of the

elder students, now undertakes the observations. The thermometers do not appear at present to be very accurately read, and the same remark applies to a less extent to the barometer. The latter instrument, which is fastened to a bookshelf in one of the lecturer's rooms, should be moved to another bookshelf a few feet away in order to be in a perfect light. The observers did not appear to be in possession of the Hygrometrical Tables supplied by the Office until the day of my visit, and I gave them such instruction as they had time for.

A new measuring-glass for the rain-gauge is imperatively required. Speaking generally, the instruments at this station are very well situated.

The following Table, similar to those which I have previously submitted, gives the corrections of the instruments, &c. at the stations inspected this year.

(Signed) W. Clement Ley.

THERMOMETERS.

| Name of Station. | Temperature of Water. | Dry Bulb. | | Wet Bulb. | | Maximum. | | Minimum. | | Spare. | General Condition. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Correction to reduce to Inspector's Standard. | Correction hitherto applied. | Correction to reduce to Inspector's Standard. | Correction hitherto applied. | Correction to reduce to Inspector's Standard. | Correction hitherto applied. | Correction to reduce to Inspector's Standard. | Correction hitherto applied. | Correction to reduce to Inspector's Standard. | |
| | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | |
| *Cambridge* | 51 | 0·0 | −0·1 | −0·1 | −0·2 | −0·2 | −0·8 | 0·0 | −0·4 | — | A |
| *Dungeness* | 61 | −0·1 | — | −0·2 | — | 0·0 | — | 0·0 | — | — | B |
| *Hurst Point* | 63 | −0·4 | — | −0·3 | — | −0·2 | — | −0·7 | — | — | A |
| *Jersey* | 64 | −0·3 | — | 0·0 | — | +0·1 | — | +0·2 | — | — | A |
| *Liverpool* | 60 | −0·05 | ? | −0·15 | ? | 0·0 | ? | 0·0 | ? | — | A |
| *Loughborough* | 47 | −0·05 | — | +0·05 | — | 0·0 | — | +0·05 | — | 0·0 | A |
| *North Shields* | 61 | 0·0 | — | 0·0 | — | 0·0 | — | +0·3 | — | — | A |
| *Prawle* | 59 | −0·3 | — | −0·3 | — | +0·6 | — | 0·0 | — | −0·4 | A |
| *Scilly* | 54 | −0·2 | — | −0·1 | — | −0·6 | — | 0·0 | — | −1·1 | A |
| *Yarmouth* | 54 | −0·05 | — | −0·2 | — | −0·1 | — | +0·1 | — | — | A |
| *York* | 60 | −0·3 | — | −0·3 | — | −0·2 | — | +0·8 | — | — | B |
| Chilworth | 47 | −0·05 | +0·1 | −0·1 | 0·0 | −0·2 | 0·0 | 0·0 | +0·1 | — | B |
| Eastbourne | 60 | −0·1 | 0·0 | −0·2 | 0·0 | −0·1 | −0·1 | −0·2 | 0·0 | −0·9 | A |
| Epsom | 46 | 0·0 | −0·1 | +0·1 | 0·0 | +0·6 | — | +0·3 | — | — | B |
| Liverpool | 60 | −0·05 | — | −0·15 | — | 0·0 | — | 0·0 | — | — | A |
| Market Rasen | 50 | 0·0 | −0·1 | −0·1 | −0·1 | −0·7 | −0·9 | +0·7 | +0·7 | — | B |
| Parkstone | 62 | −0·1 | −0·3 | −0·1 | −0·1 | +0·1 | — | 0·0 | — | — | A |
| Rugby | 44 | −0·1 | — | −0·1 | — | +0·2 | — | +0·3 | — | +0·2 | C |
| St. Leonards | 67 | −0·3 | −0·3 | −0·4 | −0·4 | −0·1 | +0·2 | 0·0 | 0·0 | — | C |
| Seaham | 57 | −0·05 | 0·0 | 0·0 | 0·0 | +0·8 | +0·5 | +0·5 | +0·5 | — | A |
| Sheffield | 58 | −0·1 | 0·0 | −0·2 | −0·1 | +0·1 | 0·0 | +0·2 | −0·1 | — | A |
| Stamford | 50 | −0·4 | +0·1 | 0·0 | 0·0 | −0·3 | −0·2 | −0·2 | +0·2 | +0·1 | A |
| Sudbury | — | — | — | — | — | — | — | — | — | — | — |
| Sutton Coldfield | 46 | 0·0 | −0·1 | 0·0 | −0·1 | +0·1 | 0·0 | −0·2 | 0·0 | −0·2 | C |
| Swanage | 65 | −0·15 | 0·0 | −0·2 | 0·0 | +0·05 | 0·0 | −0·05 | −0·1 | — | A |
| York | 60 | −0·3 | −0·1 | −0·3 | −0·1 | 0·0 | −0·1 | +0·1 | — | — | B |

Read—Letter 2268 from the Royal National Lifeboat Institution, requesting the Council to issue, free of cost forecasts daily to 105 lifeboat stations. Mr. Scott stated that he had replied (P.C. 2310), that the Council regretted they could not comply with the request on the ground of its cost. Mr. Scott was instructed to make out an approximate estimate of the cost of issuing storm warnings to the stations mentioned in the list of lifeboats forwarded with Letter 2268.

Read—Letter 2253 from the Mercantile Marine Service Association, Liverpool, asking for the supply of a set of instruments for the instruction of observers on board ships. Sanctioned (P.C. ).

Read—A letter from Mr. Baillie, stating that since last meeting five logs had been received, two of them being "excellent." Mr. Scott was instructed to present the charts O. 90 to Captain J. T. Spalding, and to convey the best thanks of the Council to the other observer.

Submitted the following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

SUMMARY.

| | | |
|---|---|---|
| A + B (successful) | = | 53 districts. |
| C (failures) | = | 11 districts. |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

On the morning of the 7th December a strong gale from S. veering to W. and N.W. was experienced in the south of Ireland and the south-west of England. At 6 p.m. on the 7th it was evident that a depression was approaching Valencia Island from the westward, but there were no reasons for supposing that the incoming disturbance would be deep. Our other coasts were warned in good time. 67

(Signed) FREDC. GASTER.

Telegraphic Branch,
December 16, 1891.

Submitted—The following list of publications which had been received since the last meeting :—

*Omond, R. T., and Rankin, A.*—The winds of Ben Nevis.

*Berg, E.*—Über die Häufigkeit und geographische Vertheilung starker Regenfälle im europaischen Russland.

*Cambridge (Mass.), Astronomical Observatory of Harvard College.*—Annals. Vol. xxx., Part ii. Observations made at the Blue Hill Meteorological Observatory, Mass., in the year 1890, under the direction of A. L. Rotch.

—— —— Annals. Vol. xix., Part i. Meteorological observations made during the years 1840 to 1888. inclusive,

*Bombay, Meteorological Office.*—Brief sketch of the meteorology of the Bombay Presidency in 1890-91.

*Tebbutt, J.*—The Sydney Observatory and the "Sydney Morning Herald." A plea for astronomy in New South Wales.

*Tacubaya, Observatorio Astronómico Nacional.*—Anuario. 1892.

*Fry, A.*—Meteorology and its uses at sea.

*Year Book of Australia.*—1886. 1890.

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63, *Victoria Street, December* 30, 1891.

PRESENT:

MR. GALTON IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. STONE. |
| PROFESSOR DARWIN. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (December 16) were read and confirmed.

Reported—That a letter (No. 2359) had been received from Messrs. Few (Minutes, p. 41) stating that some papers relating to the title to Westwood House had been recently sent for execution to the representatives of the former tenant.

Mr. Buchan's memorandum as to means of rainfall, printed on last Minutes, was taken into consideration, and Mr. Scott was instructed to ask Mr. Symons whether he

was prepared to supply at the cost for each mentioned in his letter of April 30 (Minutes, May 6) a smaller number of returns, such as the Council may select (P.C. 2406).

With reference to Letter 2268, from the National Lifeboat Institution (Minutes, December 16), Mr. Scott reported that, having entered on a map the positions of the 105 stations enumerated in that letter, he had found that, on the average of the last 10 years, the total number of telegrams required to supply warnings to those stations would be about 5,300 per annum, or an annual cost of about 132*l.*, exclusive of possible local porterage. It was resolved to take no further steps in the matter.

Read—A letter (No. 2349) from the Harbour Master, Kingstown, asking on what terms he could be supplied with a daily forecast of the weather in St. George's Channel, &c., for the use of captains windbound in that harbour. Mr. Scott was instructed to reply (P.C. 3) that the Office would prepare such forecasts gratis if the Board of Public Works would bear cost of telegraphy.

With reference to Letter 2183, from the Colonial Office, asking for the opinion of the Council on the value of observations on "rollers" at St. Helena and Ascension, Captain Wharton, to whom the matter had been referred, made a verbal communication, and promised to submit a memorandum thereon at the next meeting.

Read—A letter from Mr. Baillie stating that since last meeting six logs had been received, four of them being "excellent."

Mr. Scott was instructed to present the Charts (O. 59) to Captain A. Murray, jun., and to convey the best thanks of the Council to the other observers.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. Warnings Issued.

Summary.

| | | |
|---|---|---|
| A + B (successful) | = | 13 districts. |
| C (failures) | = | 3 districts. |

2. Gales experienced, but for which no Warnings were issued.

None.

(Signed) Fredk. J. Brodie
pro
F. Gaster.

Telegraphic Branch,
December 30, 1891.

Submitted—The following list of publications which had been received since the last meeting:—

*Gratz, Naturwissenschaftlicher Verein für Steiermark.*—Mittheilungen. 1890.

*Paulsen, A.*—Déterminations de la déclinaison magnétique en Danemark.

*Buchan, A.*—On a difference between the diurnal barometric curves at Greenwich and at Kew.

—— The influence of high winds on the barometer at the Ben Nevis Observatory.

*Anderson, J.*—Barographic record in the vicinity of a tornado.

*Wellington, Meteorological Office.*—Return of rainfall at the four principal stations in New Zealand, from January 1881 to August 1891.

*Paris, Service Hydrométrique du Bassin de la Seine.*—Observations sur les cours d'eau et la pluie centralisées pendant l'année 1890.

—— Résumé des observations centralisées pendant l'année, 1890.

*Lloyd's.*—Seaman's Almanac, 1892.

*Harries, H.*—Cold. (The "Cornhill Magazine," January 1892.)

63, *Victoria Street, January* 13, 1892.

PRESENT:

MR. STONE IN THE CHAIR.

PROFESSOR DARWIN. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 30) were read and confirmed.

Captain Wharton submitted the following memorandum (Minutes, p. 63), which was adopted, and the Secretary was instructed to forward it to the Colonial Office (P.C. 109):—

NOTE on ROLLERS (ASCENSION and ST. HELENA.)

I HAVE examined a sufficient number of the documents bearing on the question of "Rollers" to feel sure that Dr. Cleveland Abbe's explanation, that it is merely the swell from the Trade rolling round and turning in on the anchorage, is only applicable to certain cases, and that what are termed at Ascension the N.W. Rollers most certainly come from that direction from seaward.

I think the generally accepted solution, *i.e.*, distant gales, either to the north or south, may be considered all but proven.

Without a very extended and general system of observation of rollers at many places on both shores of the Atlantic, I do not see that any great advance is likely to be made in actual identification of the origin of rollers.

I cannot say that I think the labour of organising such observations and records, probably also the expense, would be worth the results, and I propose that the Colonial Office be informed that observations on rollers at St. Helena are no longer required.

(Signed) W. J. WHARTON.

January 12, 1892.

Read—Letter 48 from the Colonial Office, asking for the opinion of the Council as to the advisability of organising a proper system of telegraphing the weather between the different islands in the West Indian hurricane area. (See Minutes, 1878–79 and 1879–80.) The subject was referred to Captain Wharton.

Submitted—Two queries from the Exchequer and Audit Office on the accounts for the year 1890–91 (Letter 59), as to a missing receipt from Paris and as to variations in the honoraria paid to the Council.

The draft replies submitted by the Secretary were amended and approved.

Read—The following letter (Minutes, p. 63):—

62, Camden Square, London, N.W.,
January 1, 1892.

DEAR MR. SCOTT,

IN reply to yours of December 31st, 1891, I think that the proposal of the Council "to take the responsibility for the publication" leaves the question perfectly clear, and I am ready to supply copies of any records desired of which our copies are perfect.

I should, however, point out that the 7*s.* 6*d.* per lustrum was an exceptionally low price adopted only in consequence of the large number of returns taken, and I think that if the total number is reduced below 200, the ordinary payment of 10*s.* 6*d.* each should be made.

Yours, &c.
(Signed) G. J. SYMONS.

Read—The following letter (Minutes, 1889, p. 56):—

Royal Meteorological Society, 22, Great George Street, S.W.,
December 23, 1891.

DEAR SIR,

WE are instructed to request the attention of the Meteorological Council to the question of the amount hitherto paid by them for the returns supplied by this Society to the Meteorological Office.

The subject has been very carefully investigated by a Committee of the Society, and it was found that the amount paid for some of the returns was much less than their actual cost (even when ignoring proportional cost of office expenses).

The Council of the Royal Meteorological Society therefore submit that the payment should be—

For the detailed sheets (hitherto 10*s.* each) - - - 15*s.* each.
For the annual summaries (hitherto 3*l.*) - - - 5*l.* ,,

and will be glad to learn the views of the Meteorological Council upon the subject.

Yours faithfully,
(Signed) G. J. SYMONS,
JOHN W. TRIPE, M.D., } Secretaries.

R. H. Scott, Esq., M.A., F.R.S.,
Meteorological Office.

**Submitted**—The following report on the 8.30 p.m. forecasts for December 1891:—

The letters used have the following signification :—

**a** = complete success. | **c** = partial failure.
**b** = partial (*i.e.*, more than half) success. | **d** = total failure.

DECEMBER.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 42 | 68 | 55 | 84 |
| ,, | b | 32 | 26 | 29 | |
| ,, | c | 23 | 0 | 12 | |
| ,, | d | 3 | 6 | 4 | |
| Scotland, E. | a | 49 | 78 | 64 | 83 |
| ,, | b | 32 | 6 | 19 | |
| ,, | c | 6 | 10 | 8 | |
| ,, | d | 13 | 6 | 9 | |
| England, N.E. | a | 55 | 55 | 55 | 80 |
| ,, | b | 20 | 29 | 25 | |
| ,, | c | 19 | 13 | 16 | |
| ,, | d | 6 | 3 | 4 | |
| England, E. | a | 39 | 58 | 49 | 78 |
| ,, | b | 35 | 23 | 29 | |
| ,, | c | 26 | 16 | 21 | |
| ,, | d | 0 | 3 | 1 | |
| Midland Counties | a | 52 | 61 | 57 | 83 |
| ,, | b | 26 | 26 | 26 | |
| ,, | c | 22 | 10 | 16 | |
| ,, | d | 0 | 3 | 1 | |
| England, S. | a | 58 | 58 | 58 | 89 |
| ,, | b | 29 | 32 | 31 | |
| ,, | c | 13 | 7 | 10 | |
| ,, | d | 0 | 3 | 1 | |
| Scotland, W. | a | 39 | 61 | 50 | 75 |
| ,, | b | 26 | 23 | 25 | |
| ,, | c | 26 | 3 | 14 | |
| ,, | d | 9 | 13 | 11 | |
| England, N.W. | a | 52 | 65 | 59 | 81 |
| ,, | b | 26 | 19 | 22 | |
| ,, | c | 19 | 6 | 13 | |
| ,, | d | 3 | 10 | 6 | |
| England, S.W. | a | 45 | 68 | 57 | 89 |
| ,, | b | 39 | 26 | 32 | |
| ,, | c | 16 | 6 | 11 | |
| ,, | d | 0 | 0 | 0 | |
| Ireland, N. | a | 52 | 71 | 62 | 85 |
| ,, | b | 26 | 20 | 23 | |
| ,, | c | 16 | 3 | 9 | |
| ,, | d | 6 | 6 | 6 | |
| Ireland, S. | a | 42 | 74 | 58 | 86 |
| ,, | b | 39 | 16 | 28 | |
| ,, | c | 10 | 3 | 6 | |
| ,, | d | 9 | 7 | 8 | |
| **Summary.** | | | | | |
| British Isles | a | 48 | 65 | 57 | 83 |
| ,, | b | 30 | 22 | 26 | |
| ,, | c | 18 | 7 | 12 | |
| ,, | d | 4 | 6 | 5 | |

**Read—A letter from Mr. Baillie stating that since last meeting six logs had been received, four of them being "excellent." Mr. Scott was instructed to convey the best thanks of the Council to the observers.**

**Submitted—The following reports of work during the month of December 1891 :—**

MARINE BRANCH.

January 12, 1892.

Examined 9 new logs.

For the district between the Cape of Good Hope and New Zealand additional data have been obtained from the logs of H.M. ships and of private steamships. Progress has been made in the preparation of sea temperature means, and the wind observations in the homogeneous areas for the month of February are nearly ready for charting.

Men-of-war's logs to the number of 220 were received from the Public Record Office during the month for charting ocean currents, and the logs of private firms have been used for the same work.

Preparing sea temperature charts for a portion of the North Atlantic Ocean for the months of October and November over a series of years.

Collecting all material in the Office relating to rollers at Ascension and St. Helena.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

*Weekly Weather Report*, 1891.—All numbers issued to date.

*Appendix I.*—MS. for Parts III. and IV. well in hand.

" *II.*—MS. well in hand.

*Supplement.*—Monthly summaries to April issued. MSS. for May, June, and July nearly ready. Later months well in hand.

*Daily Weather Report*, 1891.—All numbers issued promptly. Monthly (correction and addition) sheets issued to end of *November*.

*Primary Checking of Storm Warnings*, 1891.—Done to date.

*Primary Checking of* 8.30 *p.m. Forecasts.*—Done to date.

*Examination of Inspection Notes*, 1891, for Telegraphic Reporting Stations.—Completed and reports thereon submitted.

*Establishment of a new Telegraphic Reporting Station at the North Foreland.*—From December 29 to January 2, 1892, Mr. Gaster was at the North Foreland, and saw that the instruments were properly placed and observer carefully instructed in the work of reporting. (The regular transmission of reports twice a day has since commenced.)

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

January 1, 1892.

*Hourly Means.*

The calculation of the hourly and other means for the year 1889 is being proceeded with.

The calculation of the mean values required for the Kew Annual Report for 1891 has been commenced, in view of the possibility of its being required at an early date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

January 1, 1892.

*Examinations.*

*January–August*, 1891.—Times and values of the daily *maxima* and *minima* atmospheric pressures at Kew.

*June–August*, 1891.—Kew thermograms completed.

*September*, 1891.—Work from all observatories completed.

*October–December*, 1891.—Portions of the Kew work for the Annual Report, and of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents from all observatories.

*General.*

Determination of the Fort William barograph and thermograph scales and thermograph zero line values completed (see Report, M.O. 2,222), and checking new scales.

(Signed) T E. ALLEN.

**Reported—That the following instruments were required for stock, viz.:—**

"A." Account.

| | £ | s. | d. |
|---|---|---|---|
| 25 aneroids, probable cost - - - - - | 60 | 0 | 0 |

B.T. Account.

| | | | |
|---|---|---|---|
| 100 hydrometers, probable cost - - - - | 26 | 5 | 0 |

**Submitted**—The following summary as the result of a primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

| | |
|---|---|
| A + B (successful) - - - | = 28 districts. |
| C (failures) - - - - | = 11 „ |

2. GALES, NOT WARNED FOR.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
January 13, 1892.

**Submitted**—The following list of publications which had been received since the last meeting:—

*London, Meteorological Office.*—Harmonic analysis of hourly observations of air temperature and pressure at British observatories.

—— —— Ten years' sunshine in the British Isles, 1881–90.

*Cairo, Administration des Services Sanitaires et d'Hygiène Publique.*—Rapport annuel. 1889.

*Turin, Società Meteorologica Italiana.*—Annuario meteorologico italiano. Anno vii. 1892.

*London, General Register Office.*—Annual report of the Registrar General. 1890.

*Leeward Islands.*—Annual Report for 1890.

*Brunton, T. L.*—On the method of Zadig in medicine.

*Ithaca, New York Meteorological Bureau.*—Second annual report of Commissioners of the State Meteorological Bureau and Weather Service.

*Todd, C.*—Artificial rain-production.

*Folie, F.*—Cirro-stratus et alto-stratus, par J. Vincent. Rapport de M. F Folie.

63, *Victoria Street, January* 27, 1892.

PRESENT :

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. STONE. |
| PROFESSOR DARWIN. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (January 13) were read and confirmed.

The Hydrographer submitted the following Memorandum, on proposed West Indian Storm Warnings, (Minutes, p. 64,) which was adopted :—

THAT there is no doubt that a systematised telegraphic exchange of conditions of weather between the different islands, whenever signs of approaching bad weather occur, would often be of practical utility as a warning.

It would appear that such a system would be best arranged on the spot, between the authorities of the different islands and groups, and that there are gentlemen resident who are perfectly competent to arrange details.

If the telegraph companies could be brought to agree to transmit short code messages, on such occasions, between the different islands of the Windward and Leeward Governments, no doubt it would much facilitate arrangements.

The Secretary was instructed to forward a copy of the above Memorandum to the Colonial Office (P.C. 176), and to state that the Council hoped to make arrangements for the publication of the report on the recent hurricane, which was enclosed in the letter to them.

Read—Letter 152, from Mr. Few, stating that the papers relating to the purchase of Westwood House (Minutes, p. 63) were almost completed.

Mr. Scott was instructed to write (P.C. 164) requesting Messrs. Few to claim the sum of 25*l.* from the vendors, being the amount of rent of the Revenue House, Valencia, for the six months extra tenancy (Minutes, p. 55).

Resolved—That as soon as intimation of the sum payable be received from Messrs. Few, a cheque for the amount be drawn in favour of the Treasurer of the Royal Society.

The subject of Mr. Symons' letter relating to the means of rainfall (Minutes, p. 65) was taken into consideration, and Mr. Buchan was requested to draw up a detailed scheme for the proposed publication.

With reference to the letter from the Royal Meteorological Society (Minutes, p. 65), it was resolved to tender to the Society an increment of 2*s.* 6*d.* each on the detailed sheets, and of 1*l.* each on the annual summaries, making a total increase of 19*l.* 10*s.* per annum, or one half the increment applied for (P.C. 204).

The Chairman recommended that the report on Cloud Photography at Kew, which had been referred to him (Minutes, p. 51), be inserted on the Minutes, as follows :—

REPORT on CLOUD PHOTOGRAPHY at the KEW OBSERVATORY, for the Year 1891, by G. M. WHIPPLE, B.Sc., Superintendent.

DURING the past season the operations referring to cloud photography at the Kew Observatory have comprised the following branches :—

1. Photographing clouds.
2. Printing „
3. Tabulating „
4. Experimenting with new lenses.
5. „ „ films.
6. Preparing paper for the Proceedings of the Royal Society.

1. *Photographing Clouds.*—No change whatever has been introduced in the photographic proceses employed for photographing clouds since 1889.

The plates employed are of a special size, $4\frac{3}{4} \times 4\frac{1}{4}$ inches, and are cut by Messrs. Morgan and Kidd especially for our use, and coated by them with their well-known emulsions for both plate and paper photography.

After exposure the plates are developed by the Hydrokinone developer, as sold ready mixed under the name of "Edwards' Hydrokinone Developer." This, although not, perhaps, giving such artistic results as a pyrogallic acid developer, however, is preferred by us as being always ready for use. It also possesses a minor qualification in its favour, *i.e.*, it does not stain the hands and fingers as most other developing agents do.

We usually find that with very high cirrus clouds, that cloud which appears as a mere filmy haze over the sky, the photograph can be only seen sometimes with very considerable difficulty, especially with a high sun, and it becomes hard to identify any salient feature in all the three or four pictures which go to make up a complete set, of which two are required for altitude and two for motion. Intensification of the negatives, which may be done with bichloride of mercury and ammonia, or by using Schlippe's salt, after Herr Riggenbach's method, has also been tried.

2. This operation renders the reduction of such cloud pictures somewhat more costly than is the case with ordinary negatives, our estimate for which is 10*s.* per experiment.

3. *Tabulating.*—The tabulating of the cloud heights and drifts during the year were all made by means of the comparator (Proc. R.S., Vol. XLIX., p. 476), and reduced by means of marking the distance off as measured from the slides on lithographed copies of Fig. 2, p. 477, and Figs. 3 and 4, pp. 478 and 479.

The following Table gives a summary of the resulting values of all the sets of photographs which have been obtained at the corresponding date:—

| Date and Time. | | | | Cloud. | | Direction of Travel. | Surface Wind, by Robinson's Anemograph. | | Nature of Cloud. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height. | Velocity. | | Velocity. | Direction. | |
| 1890. | d. | h. | m. | Feet. | Miles per Hour. | | Miles per Hour. | | |
| October - | 22 | 12 | 45 | 44,500 | 51 | N | 7 | SE | ci |
| " - | | " | | 33,000 | 41 | N | 7 | SE | ci |
| " - | | " | | 28,000 | 38 | N | 7 | SE | ci-str |
| " - | 22 | 12 | 50 | 29,500 | 24 | N | 7 | SE | ci |
| November - | 1 | 10 | 30 | 36,000 | 120 | NNW | 16 | NW | ci |
| " - | 4 | 10 | 30 | 23,000 | 42 | WNW | 11 | WSW | ci-str |
| " - | 11 | 1 | 0 | 24,200 | 36 | WSW | 13 | SW | ci-str |
| " - | 15 | 12 | 50 | 18,300 | 52 | SW | 13 | N | ci-str |
| " - | 15 | 1 | 25 | 20,065 | 50 | SW | 12 | N | ci-str |
| 1891. | | | | | | | | | |
| March - - | 31 | 2 | 20 | 8,300 | 13 | NW | 5 | N | str |
| " - - | 31 | 2 | 30 | 8,500 | 14 | NW | 5 | N | str |
| May - - | 7 | 10 | 40 | 26,500 | 24 | SW | 8 | NNW | ci-str |
| " - - | 12 | 11 | 45 | 6,600 | 9 | E | 11 | N | str |
| " - - | 12 | 11 | 50 | 7,200 | 11 | E | 11 | N | str |
| " - - | 14 | 5 | 35 | 31,750 | 63 | NW | 11 | NW | ci |
| " - - | 28 | 10 | 35 | 7,300 | 18 | SSW | 18 | SSW | rg-cu |
| June - - | 5 | 10 | 55 | 7,200 | 10 | SW | 7 | WNW | rg-cu |
| " - - | 19 | 4 | 55 | 23,000 | 27 | N | 12 | NNE | ci-cu |
| July - - | 3 | 5 | 5 | 18,500 | 14 | SW | 9 | W | det-str |
| " - - | 3 | 6 | 20 | 9,000 | 14 | WSW | 8 | SSW | cu |
| " - - | 15 | 4 | 0 | 18,200 | 14 | NNW | 11 | N | ci-cu |
| " - - | 15 | 4 | 10 | 20,500 | 15 | NNW | 11 | N | ci-cu |
| " - - | 24 | 10 | 20 | 11,000 | 22 | NW | 10 | W | ci-cu |
| August - - | 13 | 10 | 50 | 26,150 | 88 | WNW | 15 | W | ci-cu |
| " - - | 17 | 4 | 25 | 11,500 | 30 | SW | 11 | SSE | det-str |
| " - - | 18 | 4 | 0 | 33,000 | 93 | S | 14 | SW | ci. |
| " - - | 18 | 5 | 0 | 30,000 | 85 | S | 12 | SW | ci |
| September - | 9 | 10 | 5 | 39,200 | 19 | NW | 10 | S | ci |
| " - | 9 | 2 | 30 | 35,000 | 7 | NW | 9 | S | ci |
| " - | 9 | 3 | 25 | 36,000 | 7 | WNW | 7 | SSE | ci |
| " - | 28 | 10 | 40 | 36,300 | 32 | WNW | 20 | SW | ci |
| " - | 28 | 10 | 45 | 37,500 | 32 | WNW | 20 | SW | ci |
| " - | 28 | 3 | 0 | 39,000 | 40 | W | 19 | SSW | ci |
| " - | 28 | 3 | 10 | 39,000 | 38 | W | 19 | SSW | ci |
| October - | 8 | 10 | 45 | 31,500 | 68 | WNW | 12 | SW | ci |
| " - | 8 | 10 | 50 | 33,800 | 70 | WNW | 12 | SW | ci |
| " - | 9 | 2 | 0 | 34,000 | 92 | SW | 10 | SW | ci |
| " - | 9 | 2 | 10 | 34,000 | 92 | SW | 10 | SW | ci |
| " - | 12 | 10 | 25 | 32,000 | 140 | S | 8 | SW | ci |
| " - | 12 | 10 | 35 | 32,000 | 140 | S | 8 | SW | ci |

Altogether the observers have prepared for observation on 34 occasions, and have exposed 256 plates. By means of these plates only 43 complete sets, of four plates each, have been obtained.

In two instances two sets of three plates have resulted. It has been, however, found that in 18 instances during the 60 to 90 seconds' interval which was found to be necessary in order to change the plates in the cameras and to re-set the shutters, the clouds had so far altered their formation and shifted their positions that two sets of heights were obtained without corresponding drifts. On some occasions a mistake was made in the signalling at the time of exposure, and the plates at the two stations were not taken simultaneously.

4. *New Lenses.*—As was pointed out in the Roy. Soc. paper, p. 480, the field of view of the cameras now in use is only 30° in extent, and no cloud can be photographed unless it passes across a circle of that diameter at the zenith. As this position is the one where the apparent motion of the cloud is at its maximum, it becomes doubly difficult to succeed with objects either of low altitude or moving at high rates, so General Strachey wished that experiments might be made with the view of remedying both these defects.

For this purpose we obtained the loan from Mr. Dallmeyer of two wide angle lenses, which gave good definition over areas fully seven times those given by the old cameras, as the space covered extended over an angle of 35° on all sides of the zenith.

Pictures were obtained of cards fixed to stakes driven in the ground round the camera at known angles, and measurements which were made of them showed that the distortion was not inconveniently large until the angles exceed 35° from the centre line.*

A new camera 6 × 14 inches was roughly made and placed upon the levelling stand, and supplied with a fixed telescope for its proper orientation. Experiments were then made, which showed its suitability for the end in view.

5. *Films.*—Eastman's films were next tried with a view to employing a speedier manner of changing the plates than the old method of removing dark slides for successive exposures.

We would, therefore, suggest that for future operations in cloud photography in the zenith, new cameras, without theodolite frames or electric shutters, should be constructed, the observer making use of spring or pneumatic shutters and automatic changing boxes or roll holders, as in the case of Beck's Wier-film camera, the Magazine camera, or the Kodaks.

The electric shutters which have entailed so much expense, trouble, and uncertainty in their working have proved superfluous, and good telephones answer the purpose of signalling quite well.

By the use of films instead of plates, many more might be exposed at each journey, without requiring the observer to return to the dark room, which always entails a walk of nearly a mile, and taking up his time, during which probably great changes in the appearance of the sky will occur, and opportunities for further work will be often lost.

6. In preparing the paper for the Royal Society quoted above, photographs of the apparatus and diagram were prepared for illustration by the optical lantern, and in addition the lithographed forms for tabulating the results forwarded with this paper have been prepared at the Meteorological Office.

Owing to the defects above described in the appliances in use, no attempt has been made in the present discussion, to treat the question of rise or fall of the clouds or to examine the changes in structure from hour to hour or day to day.

The necessary changes in the staff of observers during the year have entailed the employment of the following assistants in the work, Messrs. W. Hugo, R. S. Whipple, W. Gough, E. Jurd, B. Pocock, F. Oliver, at different times.

Mr. Scott submitted the following notes as to the principal matters contained in the Inspectors' Reports (Minutes, pp. 24, 27, 29, 56, and 57), on which action had either been taken already or was required.

At Scilly and Hurst Castle defective thermometers have been changed.

In Mr. Ley's report (p. 57) remarks are made as to several stations which are found unsatisfactory. The returns from the following stations, Epsom, Rugby, Seaham, Sheffield, Sudbury, and Totland Bay, are not published.

At Tenby (p. 56) it has been decided to accept the station for sunshine only, and to print the values in the Weekly Weather Report.

In the cases of Epsom, Lockner Holt, and York, letters have been written drawing attention to the defects noted.

Read—A letter from Mr. Baillie, stating that since last meeting six logs had been received, three of them being "excellent." Mr. Scott was instructed to convey the marked thanks of the Council to the observers.

---

* *Note.*—Similar experiments were made with the lenses in use in the cameras since 1881, and the results showed that they are quite capable of covering a plate seven inches square without much distortion, affording an exposure of an angle 30° on each side of the zenith, thereby giving a field of view five times in extent that of the pictures now taken.—G. M. W.

**Submitted**—The following statement of accounts for the nine months ending 31st December 1891 :—

| Income. | £ s. d. | £ s. d. |
|---|---|---|
| Balance from year 1890–91 | - - - | 2,627 17 2 |
| Proportion of Vote - | - - - | 11,475 0 0 |
| Repayment of expenses charged under— | | |
| (1.) Incidental expenses | 12 14 11 | |
| (2.) Observatories - | 14 4 4 | |
| (3.) International Meteorology - | 1 14 0 | 28 13 3 |
| Supply of Weather Information : | | |
| D.W. Charts and Forecasts - - | 180 15 1 | |
| 6 p.m. Charts - | 18 15 0 | |
| Information for Press Agencies, &c. - | 86 12 7 | |
| Telegrams - - - | 119 10 7 | 405 13 3 |
| Sale of Instruments, &c. : | | |
| M.O. account - | 35 13 6 | |
| Royal Navy account - | 25 5 0 | |
| Mercantile Marine account - - | 39 9 4 | 100 7 10 |
| Commission charged on work done for Colonies, &c. - - | - - - | 16 2 3 |
| | | £14,653 13 9 |

| Expenditure. | £ s. d. | £ s. d. |
|---|---|---|
| Administration : | | |
| Payment of Council - | 750 0 0 | |
| Secretary - - | 600 0 0 | |
| Salaries and wages - | 594 19 6 | |
| Rent, fuel, and lighting - | 509 2 0 | |
| Furniture and fittings* - | 172 2 2 | |
| Incidental and contingent expenses - | 287 3 10 | |
| Expenses incidental to International Meteorological Congress | 34 10 9 | |
| Pensions - - | 140 2 3 | 3,088 0 6 |
| Special Researches - | - - - | 715 3 7 |
| Land Meteorology : | | |
| Observatories and stations - - | 1,785 9 2 | |
| Discussion and reduction of observations - | 953 8 0 | 2,738 17 2 |
| Weather Information and Forecasts : | | |
| Telegraphic reports and storm warnings - | 1,885 4 5 | |
| Preparation and issue of reports and forecasts - - | 1,369 2 11 | 3,254 7 4 |
| Inspections : | | |
| Salaries and travelling - | - - - | 503 8 9 |
| Ocean Meteorology : | | |
| Discussion and reduction of observations - | 1,252 19 0 | |
| Expenses incidental to the supply of instruments : | | |
| Proportion for care and issue of instruments - | 150 0 0 | |
| Royal Navy - | 184 18 11 | |
| Mercantile Marine | 154 17 7 | |
| Distant island and coast stations - | 26 12 11 | 1,769 8 5 |
| Balance - - - | - - - | 2,584 8 0 |
| | | £14,653 13 9 |

| Liabilities. | £ s. d. |
|---|---|
| To Council - - - - | 750 0 0 |
| „ Post Office (partly estimated) - | 312 9 2 |
| „ sundry creditors - - - | 264 3 3 |
| „ balance - - - - | 2,584 8 0 |
| | £3,911 0 5 |

| Assets. | £ s. d. |
|---|---|
| By cash at Bank - - - | 2,603 17 2 |
| „ „ at Office - - - | 84 13 0 |
| „ sundry debtors - - - | 247 10 3 |
| „ H.M. Exchequer - - - | 975 0 0 |
| | £3,911 0 5 |

* Some expenses under this head not yet brought to account.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

*Summary.*

| | |
|---|---|
| A + B (successful) - - - - | = 12 districts. |
| C (failures) - - - - - | = 8 „ |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
January 27, 1892.

Mr. Scott reported--That the following instruments were required for stock :—

"A" Account.

| | Probable Cost. £ | s. | d. |
|---|---|---|---|
| 25 maximum thermometers for ship use - - - | 16 | 17 | 6 |
| 100 thermometers - - - - - | 35 | 0 | 0 |
| 24 japanned copper cases - - - - | 1 | 16 | 0 |

"B.T." Account.

| | | | |
|---|---|---|---|
| 100 thermometers - - - - - | 35 | 0 | 0 |
| 100 hydrometers - - - - - | 26 | 5 | 0 |

—Approved.

Submitted—The following list of publications which had been received since the last meeting :—

*Tiflis, Physikalisches Observatorium.*—Meteorologische Beobachtungen. 1890.
—— Magnetische Beobachtungen. 1890.
—— Beobachtungen der Temperatur des Erdbodens im Jahre 1884, nebst Anhang. Beobachtungen am Radiations-Thermometer in den Jahren 1881–1884.
—— Beobachtungen der Temperatur des Erdbodens. 1885

*Zürich, Schweiz. Departement des Innern.*—Graphische Darstellung der schweizerischen hydrometrischen Beobachtungen. 1891.

*Schreiber, P.*—Untersuchung über die Periodicität des Niederschlages im Königreich Sachsen.

*Wild, H.*—Mittheilungen der internationalen Polar-Commission. Siebentes Heft (Schluss).

*Tyrer, R.*—The meteorology of Cheltenham. 1891.

*Dickson, H. N.*—Physical investigations.
—— Notes on meteorological observations at Plymouth.

*Lang, C.*—La prévision du temps.

*Glyde, E. E.*—Ninth report (second series) of the Committee on the climate of Devon.
—— Abstract of meteorological observations made at Kirkham, Babbacombe, Torquay, during the year 1891.

*Cambridge (Mass.), Astronomical Observatory of Harvard College.*—Annals. Vol. xxx., Part i. Observations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., in the year 1889.

*Kingston, Institute of Jamaica.*—The rainfall of Jamaica. Thirteen maps showing the average rainfall in each month and during the year. By M. Hall.

*London, Royal Society.*—Catalogue of Scientific Papers. 1874–1883. Vol. ix.

63, *Victoria Street, February* 10, 1892.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (January 27) were read and confirmed.

Read—Letters 223, 257, and 292 from Messrs. Few, informing the Council that the vendors of Westwood House declined to allow the deduction of 25*l.* from the price of that property (Minutes, p. 68), and that the total amount payable was 1,300*l.* A cheque for that amount, in favour of the Treasurer of the Royal Society, was accordingly drawn.

Read—Letter 2262, 1890, from Mr. Cullum, relative to the erection of a private wire between Westwood House and Cahirciveen, and Mr. Scott was instructed to communicate with the General Post Office as to the establishment of such connection. (P.C. 312.)

Mr. Scott reported that, in pursuance of verbal instructions from the Chairman, he had gone to the Treasury on the 29th ultimo, and had learnt that that office would not raise any objection to the investment by the Council of any balance at any time available for the purpose, so long as the Council continued to apply for their Grant at the same intervals and in the same amounts as heretofore.

The Council assented generally to the expediency of investing any balance of cash at their command, and agreed to wait until the end of the financial year, when a decision can be come to as to the amount available for investment.

With reference to Mr. Whipple's report on the cloud measurements (Minutes, p. 68) Mr. Scott was instructed to request him to send up 12 sets of plates and the apparatus, that some of the measurements might be checked independently. (P.C. 308.)

Read—Letters 277 and 298 from Mr. Dines accompanying his report on the anemometer comparisons (Minutes, p. 51). Mr. Scott was instructed to inform Mr. Dines that the Council would communicate the paper to the Royal Meteorological Society as soon as he thinks it is complete. (P.C. 303.)

Mr. Scott stated that a draft report on the experiments made at Kew with Violle's actinometer in 1890 (M.O. 10, 1891) had been received from Mr. H. F. Blanford (Minutes, 1889, p. 90).

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

(1.) WARNINGS ISSUED.

| | |
|---|---|
| A + B (successful) - - - - | = 20 districts. |
| C (failures) - - - - - | = 5 districts. |

(2.) GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

Telegraphic Branch,
February 10, 1892.

(Signed) FREDC. GASTER.

Read—A memorandum from Mr. Baillie, stating that since last meeting six logs had been received, five of them being "excellent." Mr. Scott was instructed to present the charts O. 27 to Captain Rohde and to convey the marked thanks of the Council to the other observers.

Submitted—The following report on the 8.30 p.m. forecasts for January 1892:—

The letters used have the following signification:—

a = complete success.
b = partial (*i.e.* more than half) success.
c = partial failure.
d = total failure.

JANUARY.

| Districts. | | Per-centages. Wind. | Weather. | Average Forecast. | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| Scotland, N. | a | 45 | 62 | 54 | 81 |
| " | b | 23 | 32 | 27 | |
| " | c | 23 | 3 | 13 | |
| " | d | 9 | 3 | 6 | |
| Scotland, E. | a | 39 | 65 | 52 | 81 |
| " | b | 32 | 26 | 29 | |
| " | c | 16 | 0 | 8 | |
| " | d | 13 | 9 | 11 | |
| England, N.E. | a | 58 | 61 | 60 | 84 |
| " | b | 26 | 23 | 24 | |
| " | c | 13 | 10 | 12 | |
| " | d | 3 | 6 | 4 | |
| England, E. | a | 45 | 52 | 49 | 84 |
| " | b | 39 | 32 | 35 | |
| " | c | 6 | 13 | 10 | |
| " | d | 10 | 3 | 6 | |
| Midland Counties | a | 42 | 55 | 49 | 81 |
| " | b | 35 | 29 | 32 | |
| " | c | 10 | 10 | 10 | |
| " | d | 13 | 6 | 9 | |
| England, S. | a | 55 | 45 | 50 | 84 |
| " | b | 32 | 36 | 34 | |
| " | c | 3 | 16 | 10 | |
| " | d | 10 | 3 | 6 | |
| Scotland, W. | a | 32 | 55 | 44 | 58 |
| " | b | 13 | 16 | 14 | |
| " | c | 42 | 10 | 26 | |
| " | d | 13 | 19 | 16 | |
| England, N.W. | a | 26 | 61 | 44 | 71 |
| " | b | 29 | 26 | 27 | |
| " | c | 32 | 7 | 20 | |
| " | d | 13 | 6 | 9 | |
| England, S.W. | a | 52 | 52 | 52 | 73 |
| " | b | 26 | 16 | 21 | |
| " | c | 16 | 29 | 23 | |
| " | d | 6 | 3 | 4 | |
| Ireland, N. | a | 48 | 71 | 60 | 79 |
| " | b | 16 | 23 | 19 | |
| " | c | 26 | 6 | 16 | |
| " | d | 10 | 0 | 5 | |
| Ireland, S. | a | 39 | 55 | 47 | 72 |
| " | b | 26 | 23 | 25 | |
| " | c | 22 | 13 | 17 | |
| " | d | 13 | 9 | 11 | |

SUMMARY.

| | | | | | |
|---|---|---|---|---|---|
| British Isles | a | 44 | 57 | 51 | 77 |
| " | b | 27 | 26 | 26 | |
| " | c | 19 | 11 | 15 | |
| " | d | 10 | 6 | 8 | |

**Submitted—The following reports of work during the month of January 1892 :—**

MARINE BRANCH.

February, 1892.

**Examined 14 new logs.**

**Collecting observations from Office and from men-of-war logs entering the district between the Cape of Good Hope and New Zealand. Obtaining barometer and sea temperature means; also wind results in the homogeneous areas for the month of August. Preparing a specimen wind chart for February.**

**Charting currents in all oceans. For this branch of the work 435 logs of H.M. ships were received from the Public Record Office in the course of the month.**

**Preparing monthly charts of sea temperature for a series of years for the part of the Atlantic Ocean to the westward of the British Isles.**

**Indexing data in ocean 10-degree squares.**

(Signed) CHAS. HARDING.

**The Marine Superintendent.**

**Forwarded for the information of the Council.**

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To January 31, 1892.)

*Weekly Weather Reports*, 1891.—All appendices published.

*Monthly Summaries* to end of August have been revised and are expected in daily. Summary for September is in hand and being pushed forward. Title-page and preface for year is in printer's hands. (See below.)

*Daily Weather Reports*, 1891.—Complete excepting title-page (see below) and frontispiece.

*Primary Checking of Storm Warnings*, 1892.—Done to date.

*Checking of Forecasts* (8.30 p.m.).—Done to date.

*Tables of Mean Pressure, &c.*—The following tables are now all but complete :—

1. *For Weekly Weather Report Stations.*—Mean monthly values for—
   *Temperature.*—Daily maxima and minima in shade, and of maxima and minima combined, for 20 years, 1871–90.
   *Rainfall.*—Mean monthly values for 25 years, 1866–1890.
   *Bright Sunshine.*—Mean monthly values for 10 years, 1881–90, for all stations for which information is available.

   It is proposed to incorporate these with the introduction to the Weekly Weather Report, 1891.

2. *For Daily Weather Report Stations.*—Mean monthly values for—
   *Barometric Pressure* at 8 a.m.—20 years, 1871–90.
   *Temperature.*—Daily maxima and minima and maxima and minima combined. Also means of *dry* and *wet* bulb readings at 8 a.m., 20 years, 1871–90.
   *Rainfall.*—Mean monthly totals for 25 years, 1866–90.

   It is proposed to publish these as an introduction to the second volume of the Daily Weather Report, 1891.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

February 1, 1892.

*Hourly Means.*—The calculation of the various mean values required for the volume of "Hourly Means" for the year 1889 has been carried on steadily, and is now well advanced.

The calculation of the means for 1891 required for the table supplied to Kew Observatory, for insertion in the Annual Report, has been completed for about one half of the year.

The usual routine work of the Room has been kept up to date.

(Signed) R. H. CURTIS.

**R. H. Scott, Esq., F.R.S., &c.**

EXAMINATION BRANCH.

February 1, 1892.

*Examinations.*

*October*, 1891.—Work nearly completed for all observatories.

*November and December*, 1891.—Valencia work completed.

*November*, 1891.—Kew work completed. Weekly examination (on receipt) of curves and documents from all observatories.

*Reports.*

*August* 1891.—Copies of "Notes of Errors" to all observatories.

*Miscellaneous.*

*Diurnal Range of Rainfall,* 1870–1890.—Proceeded with.

Revising M.O. Forms Nos. 30 and 31, and E.B. Forms Nos. 4 and 5, and correcting proof thereof.

Indexing registers of "Letters Received" and "Despatched," 1891–92.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting :—

*Washington, Signal Office.*—International monthy charts of mean pressures and wind directions at 7 a.m., Washington mean time, for 1882 and 1883.

*Rome, Ufficio Centrale Meteorologico e Geodinamico Italiano.*—Annali. Serie ii., vol. ix., 1887, Parte 1–5.

*Dewar, D.*—Weather forecasts, 1892–93.

*McLandsborough, J., and Preston, A. E.*—Meteorology of Bradford for 1891.

*Dines, W. H.*—Mutual influence of two pressure plates upon each other, and comparison of the pressures upon small and large plates.

—— On the variations of pressure caused by the wind blowing across the mouth of a tube.

—— Report of the wind-force Committee on the factor of the Kew Pattern Robinson anemometer.

—— On testing anenometers.

—— Account of some experiments made to investigate the connection between the pressure and velocity of the wind.

—— Report of the wind-force Committee on experiments with anemometers conducted at Hersham.

—— A new form of velocity anemometer.

—— On the pressure of wind on curved vanes.

—— On wind pressure upon an inclined surface.

*Eberswalde, Hauptstation des forstlichen Versuchswesen in Preussen.*—Jahresbericht über die Beobachtungs-Ergebnisse der von den forstlichen Versuchsanstalten des Königreichs Preussen . . eingerichteten forstlich-meteorologischen Stationen. 1890.

*Ithaca, New York Meteorological Bureau.*—Report of Commissioners of the State Meteorological Bureau and Weather Service.

*Melbourne Observatory.*—Twenty-Sixth Report of the Board of Visitors to the Observatory.

*Washington, U.S., Naval Observatory.*—Report of the Superintendent for the year ending 1891, June 30.

63, *Victoria Street, February* 24, 1892.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| MR. BUCHAN. | MR. GALTON. |
| PROFESSOR DARWIN. | MR. STONE. |

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 10) were read and confirmed.

Reported—That the cloud photographs and apparatus had been received from Kew on the 17th instant (Minutes, p. 73).

Read—Letter 389 from Messrs. Few, stating that they expected that the purchase of Westwood House would be completed in the course of the current week.

Mr. Scott stated that he had already applied to the Kew Committee to allow Mr. Whipple leave to go to Valencia to superintend the removal of the apparatus (P.C. 347).

He further stated that an agreement had been signed with the Post Office for the establishment of a private telephone wire between Cahirciveen and the Observatory for the sum of 19*l.* 10*s.* 0*d.* annually (Minutes, p. 75, P.C. 341).

Mr. Buchan submitted the following memorandum as to the proposed publication of means of rain observations (Minutes, p. 68) :—

(M.O. 432.)

MEMORANDUM on PUBLICATION of BRITISH RAIN MEANS.

The subject falls under two heads :—

I. The completion of the 25 years' period ending with 1890, and

II. The publication of returns for other periods, particularly as regards long averages, exceptionally heavy rainfall averages, and the representation of important districts from which returns are not available for longer periods than, say, 19 years.

## I. THE 25 YEARS' PERIOD, 1866–90.

Under this head the most important point to be considered is Mr. Symons's table giving a "List of stations quoted in tables for 1866–80 not available for 1881–90, and of suggested substitutes."

On this table I have entered in *red ink* calculated annual averages for the 24 years ending with 1883 of the 118 stations not now available for the last ten years and the annual averages of the proposed substitutes for these stations.

It is not easy to discover any principle on which these stations proposed to be substituted have been selected, the substitutes being in many cases at great distances from the original stations and with great seasonal differences of rainfall; but more frequently the mean annual amounts are so widely different as to render it impossible to substitute the one station as a representative of the other.

The following will show the error of excessive distance :—

| Original Stations. | Substitutes. |
|---|---|
| Glenstrathfarrer. | Cawdor. |
| Laggan. | Fort William. |

But it is differences of their mean annual rainfalls which raise the most serious objections. The red figures in the table present this in the clearest light. Of these the following are among the more striking :—

| Original Stations. | Inches. | Stations proposed to be substituted. | Inches. |
|---|---|---|---|
| Glenstrathfarrer - - - | 58·38 | Cawdor - - - - | 31·24 |
| Portree - - - - | 88·36 | Loch Sheil - - - - | 106·35 |
| Laggan - - - - | 48·44 | Fort William - - - - | 78·70 |
| Perth - - - - - | 33·10 | Dunkeld - - - - | 40·74 |
| Clonbrin, Co. Kildare - - - | 33·64 | Dromore, Co. Kerry - - - | 64·85 |
| Ulleswater (Hallsteads) - - | 56·75 | Penrith (F.C.F.B.) - - - | 31·20 |
| Fernhurst - - - - | 31·43 | Compton - - - - | 38·50 |
| Windermere, The Wood - - | 69·06 | Ambleside (N.C.) - - - | 77·46 |
| Thornton in Craven - - - | 41·45 | Otterham, Craven - - - | 46·90 |

In Mr. Symons's table I have scored out, with red ink, those stations for which the proposed substitutes are unsuitable, owing to the differences between their mean annual rainfalls, and in doing so have kept in view the per-centages of the differences. Thus it is evident that, while in the driest districts, with the rainfall not exceeding 25 inches, 2 inches of excess is large, the same amount of the difference in wet districts is small.

The result is that 55 of the proposed substitutes are rejected and 63 retained.

As regards substitutes, I should propose that the two stations be not more apart than 10 miles from each other, and the difference of their mean annual rainfalls be not more than 5 per cent, and that as regards the returns from Mr. Symons, that those from the original station be adopted down to the time it ceased to be a rain-observing station, and that the returns from the substitute follow, the time when the latter commenced being noted in the table.

On the other hand, as regards the adoption of new pairs of stations for filling up gaps on the map of rainfall stations, it is proposed that the returns from the station still observing be adopted from the commencement of its record, the remaining years at the beginning of the 25 years' period being adopted from the station which had ceased to observe.

On considering the importance of those districts where in Mr. Symons's Rainfall Tables stations were thickly planted, from the circumstance that these form the grounds whence are drawn the water supplies of large portions of the population, it is proposed that stations may still be somewhat more thickly planted in the Council's Rainfall Map than elsewhere. Thus in the gathering grounds of the Glasgow water-supply the mean annual rainfall varies from 59 to 95 inches. A thicker planting of stations over this district will therefore be a distinct contribution to the Council's publication as regards this department of meteorology.

If it were resolved that of the stations adopted, an increase of at least 10 per cent. be shown between each set of two of the stations in passing from the lowest to the highest mean annual rainfalls of the stations, a check would be put to any undue multiplication of stations.

I submit a map showing additional stations from which the required returns for the 25 years, 1866–90, could be supplied by the Scottish Meteorological Society, either for the whole 25 years continuously, or from pairs of stations, on the lines indicated above.

## II. For Long Periods.

Under this head reference may be made to the two concluding paragraphs of my previous memorandum (Minutes, p. 56).

I submit a diagram showing from 1800 to 1890 the stations from which returns for long periods are available, and the separate years for each station (with a map of the stations). To these are added, in black circles on the map, a few other stations where the rainfall is either exceptionally large, or otherwise interesting from the position of the stations.

It may be remarked, as regards a large number of these stations, that the actual number of years really required is fewer than might at first be supposed, since 25 years of the whole number will be in the possession of the Council. To obviate crowding of stations, a number from which long averages are available are omitted.

The following stations, in black on map, from which less than 30 years are available, are entered for these reasons :—

| | |
|---|---|
| Glenquoich, 105 inches<br>Glenaladale, 106 „ | For large rainfall. |
| Portree - - | Ditto. |
| Arrochar - - | Ditto. |
| Monach, Outer Hebrides | Exceptional position. |
| Dalnaspidal | On watershed of Grampians. |
| New Pitsligo | Largest rainfall in Aberdeenshire, and large agricultural centre. |
| Lairg - - | Centre of extensive moorlands. |

A. B.

**The Council having considered Mr. Buchan's report, came to the following conclusions:—**

**They concurred in the opinion that the stations objected to by Mr. Buchan were unsuitable as substitutes for the stations which Mr. Symons had proposed they should replace.**

**But they further considered that no *actual substitution* of a new station for an old one could be agreed to, in the sense of combining the rainfall registers, and publishing them as supplying a continuous record of the rain for the area within which the two stations were situated. The only satisfactory way of dealing with the subject would be: *First*, to continue the register of the old station as far as the data permitted, and to note that it had then ceased; and *Second*, to select, if possible, as suggested by Mr. Buchan, a new station in the neighbourhood of the old one, which showed a rainfall not differing from that of the old station by more than some such proportion as 5 per cent., at which a continuous register was available for at least 10 years, and that this register extended backwards, if possible, to 20 years, should be inserted among the tabular statements as an entirely distinct entry, with a description of the new locality, in exactly the same form as that adopted in the volume already published.**

**It would be for further consideration to what extent the new stations proposed by Mr. Symons supplied data that would justify the publication of the registers made at them, either as replacing old stations, as above proposed, or as entirely new stations, but no such wholly new station would be accepted that did not supply a continuous register of at least 20 years.**

To obtain the requisite data for making the selection of stations for publication on this basis, Mr. Scott was instructed to forward to Mr. Symons the list of "stations not available for 1881–90, and of suggested substitutes" referred to by Mr. Buchan, requesting him to mark thereon, for the first column of names, the dates of cessation of the record, and, for the second column of names, the date of commencement of the record (P.C. 456).

Mr. Buchan was also requested to prepare, in a form as nearly like that of the volume already published as is practicable, the registers extending over long periods made at the selected Scottish stations, which he thinks suitable and sufficient. Also so far as they may be made available, a corresponding series of registers from stations in other parts of the British Isles may usefully be prepared for publication in the Meteorological Office.

Read—Letter 404 from the Royal Meteorological Society, accepting the proposal of the Council with reference to the payment for registers supplied to it (Minutes, p. 68), and asking if the Office would include the returns from Rounton among those obtained from the Society.

Mr. Scott having recommended that Rounton be accepted as a station for which returns on Form B. should be printed, he was authorized to accept the station (P.C. 428).

Read—Letter 403, from the Royal Meteorological Society, reporting that the Report on the Hurricane of Antigua in August 1891 had been accepted for reading and printing in the Journal, and Mr. Scott said that he had already informed the Colonial Office accordingly (P.C. 362, Minutes, p. 68).

Mr. Baillie submitted a set of specimen charts of the Red Sea data (Minutes, 1885, p. 41) for the month of March showing a proposed new method of exhibiting the frequency, force, and direction of the wind. These were generally approved with some slight modifications, and it was resolved that the charts for the remaining months should be completed on the same plan and submitted to the Hydrographer prior to being forwarded to the engraver.

Mr. Baillie also submitted a specimen wind chart for the route from the Cape of Good Hope to New Zealand for the month of February (Minutes, 1890, p. 73), which was generally approved.

Read—A memorandum from Mr. Baillie, stating that since last meeting five logs had been received, three of them being excellent. Mr. Scott was instructed to present the charts O. 90 to Lieutenant Smyth and O. 92 to Surgeon Bett, both of H.M.S. "Stork," and to convey the best thanks of the Council to the other observers.

**Submitted—The following statement respecting the Records for January to June, 1891, received from the Self-recording Observatories (see Minutes, 21st December, 1868; 20th November, 1876; 3rd January, 1883; and 6th March, 1889):—**

| JANUARY—JUNE. | ABERDEEN. | | ARMAGH. | | FALMOUTH. | | FORT WILLIAM. | | KEW. | | VALENCIA. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANEMOGRAPH:— | Direction. | Velocity. | Direction. | Velocity. | Direction. | Velocity. | Direction. | Velocity. | Direction. | Velocity. | Direction. | Velocity. |
| *Action of Instrument* | Good. | Good. | Good. | Good. | Good. | Good. | — | — | Good. | Good. | Good. | Good. |
| *Records deficient:*— | | | | | | | | | | | | |
| Due to stoppage of clock | 0 | 0 | 38 hrs. | 39 hrs. | 0 | 0 | — | — | 0 | 0 | 3 hrs. | 5 hrs. |
| „ other causes | 0 | 0 | 0 | 0 | 0 | 0 | — | — | 0 | 0 | 1 hr. | 2 hrs. |
| *No. of errors discovered:*— | | | | | | | | | | | | |
| By general examination | 0 | 0 | 2 | 17 | 4 | 1 | — | — | 13 | 6 | 11 | 11 |
| *Rslts. of 40 Remeasmnts.:*— | | | | | | | | | | | | |
| Greatest difference | 1·0 | 2·0 | 1·0 | 2·0 | 1·0 | 2·0 | — | — | 1·0 | 2·0 | 1·0 | 2·0 |
| Mn. diff. irrespctv. of sign | 0·2 | 0·5 | 0·2 | 0·4 | 0·2 | 0·5 | — | — | 0·2 | 0·4 | 0·2 | 0·5 |
| Residual diff. (−M. O.) | 0·0 | 0·0 | −0·1 | 0·0 | 0·0 | 0·0 | — | — | 0·0 | 0·0 | 0·0 | 0·0 |
| *Orientation* verified | Monthly | — | Monthly | — | Monthly | — | — | — | Monthly | — | Monthly | — |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RAIN-GAUGE:— | | | | | | | | | | | | |
| *Action of Instrument* | Good. | | Good. | | Good. | | Bad to Indifferent.* | | Good. | | Indifferent to Good. | |
| *Records deficient:*— | | | | | | | | | | | | |
| Due to stoppage of clock | 0 | | 0 | | 0 | | 5 hrs. | | 12 hrs. | | 0 | |
| „ other causes | 0 | | 0 | | 0 | | 0 | | 33 hrs. | | 0 | |
| *No. of errors discovered:*— | | | | | | | | | | | | |
| By general examination | 2 | | 12 | | 1 | | 0 | | 4 | | 43 | |

| —— | ABERDEEN. | FALMOUTH. | FORT WILLIAM. | KEW. | VALENCIA. |
|---|---|---|---|---|---|
| BAROGRAPH:— | | | | | |
| *Action of Instrument* | Good. | Good. | Good. | Good. | Good. |
| *Character of Photography* | Do. | Excellent. | Do. | Do. | Do. |
| *Records deficient:*— | | | | | |
| Due to stoppage of clock | 0 | 0 | 6 hrs. | 0 | 7 hrs. |
| „ failure of light | 0 | 7 hrs. | 3 hrs. | 0 | 2 hrs. |
| „ other causes | 7 hrs. | 8 hrs. | 4 hrs. | 9 hrs. | 0 |
| *No. of errors discovered:*— | | | | | |
| In entry of standards | 0 | 4 | 15 | 2 | 6 |
| „ calculating residuals | 0 | 1 | 16 | 5 | 2 |
| „ applying „ | 0 | 0 | 16 | 25 | 2 |
| By general examination | 0 | 4 | 23 | 18 | 98 |
| *Rslts. of 40 Remeasmnts.:*— | | | | | |
| Greatest difference | ·006 | ·008 | ·007 | ·008 | ·010 |
| Mn. diff. irrespctv. of sign | ·002 | ·002 | ·002 | ·003 | ·003 |
| Residual diff. (−M. O.) | −·001 | ·000 | −·001 | ·000 | −·001 |
| *Mean monthly diff. between simultaneous Bargph. and Stand. Bar. readings* | ·001 | ·002 | ·002 | ·002 | ·002 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| THERMOGRAPH:— | | | | | | | | | | | | |
| *Action of Instrument* | Good. | | Good. | | Good. | | Good. | | Good. | | Good. | |
| *Character of Photography* | Do. | | Do. | | Do. | | Do. | | Do. | | Do. | |
| *Records deficient:*— | Dry. | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | Wet. |
| Due to stoppage of clock | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| „ failure of light | 0 | 0 | 1 hr. | 1 hr. | 5 hrs. | 0 | 0 | 0 | 11 hrs. | 0 | | |
| „ impfctly. moist. bulbs | — | 34 hrs. | — | 9 hrs. | — | 28 hrs. | — | 2 hrs. | — | 17 hrs. | | |
| „ partlly. frozen bulbs | — | 144 hrs. | — | 54 hrs. | — | 63 hrs. | — | 236 hrs. | — | 27 hrs. | | |
| „ other causes | 0 | 0 | 15 hrs. | 15 hrs. | 1 hr. | 1 hr. | 0 | 3 hrs. | 0 | 1 hr. | | |
| *No. of errors discovered:*— | | | | | | | | | | | | |
| In entry of standards | 2 | 2 | 2 | 2 | 4 | 11 | 3 | 7 | 1 | 1 | | |
| „ maxima and minima | 6 | — | 1 | — | 15 | — | 3 | — | 5 | — | | |
| By general examination | 1 | 1 | 5 | 2 | 15 | 18† | 13 | 8 | 15 | 29 | | |
| *Rslts. of 40 Remeasmnts.:*— | | | | | | | | | | | | |
| Greatest difference | 0·2 | 0·2 | 0·2 | 0·2 | 0·4 | 0·7 | 0·2 | 0·2‡ | 0·3 | 0·3 | | |
| Mn. diff. irrespctv. of sign | 0·1 | 0·1 | 0·1 | 0·1 | 0·1 | 0·3 | 0·1 | 0·1 | 0·1 | 0·1 | | |
| Residual diff. (− M. O.) | −0·1 | −0·1 | 0·0 | −0·1 | +0·1 | 0·0 | 0·0 | 0·0 | +0·1 | 0·0 | | |
| *Mean monthly diff. between simultaneous Thergph. and Stand. Ther. readings* | 0·2 | 0·2 | 0·1 | 0·2 | 0·2 | 0·1 | 0·1 | 0·3 | 0·2 | 0·2 | | |

* In action during January, May, and June only. † See notes. ‡ January—April only.

## Anemograms.

*Aberdeen.*—Attention was called to the defective beginning and ending of the velocity traces in the March notes. The oil in the bearings was found to be in good condition on the 31st March.

*Armagh.*—The velocity traces were intermittent at low rates owing to a mechanical defect.

*Falmouth.*—The instrument was oiled on the 1st January, 2nd February, 5th March, 5th May, and 5th June.

*Kew.*—The instrument was oiled on the 5th January, 9th February, 12th March, 20th April, 8th May, and cleaned and oiled on the 10th June. The pricker by which the times of beginning and ending are indicated on the curves was a source of trouble throughout the period, on account of its becoming bent. It was examined and put right on the 29th April, and again on the 2nd May. Attention was called to the serrated appearance of the velocity traces at moderate rates, but without result.

*Valencia.*—The clock was dismounted and cleaned on the 23rd February, and the instrument was oiled on the 4th February, 6th March, and 5th June. Attention was drawn to the serrated appearance of the velocity traces, and on examination the cause was discovered and the defect remedied (7th April).

## Rain-Gauges.

*Aberdeen.*—The instrument was working satisfactorily throughout.

*Armagh.*—The difference between the daily falls of rain indicated by the traces and measured in the glass, was the subject of a note on the March work, and more satisfactory results followed.

*Falmouth.*—The instrument was in good order and working satisfactorily.

*Fort William.*—The action was quite unreliable, rendering the hourly values doubtful. On the 27th February the instrument was dismounted and sent to Kew for examination, when it was found that "the capacity of the receiver" was only "·180 ins.," so that each complete fall of trace on the curve represents this amount instead of ·200 ins. (see M.O. 795). The records were recommenced at 10.40 a.m. on the 2nd May.

*Kew.*—The clock-line broke on the 28th January and was made good. The faintness of the traces, and the discovery that the composition with which the papers are coated deteriorates to the point of total loss within 20 years of their production, led to an extended series of experiments with various papers, using a Richard's aniline ink pen as the marking medium; these experiments continued to the end of the period.

*Valencia.*—The traces were faint, and the attachment of papers very indifferent. In April special attention was called to the want of care in the tabulation of the curves (see tabulated report); and in the May work it was found that there was a difference between the totals shown by the traces and the amount collected in the receiver, indicating a defect in the gauge, and Mr. Cullum's attention was drawn thereto (P.C. 1268).

## Barograms.

*Aberdeen.*—Signs of over-development in the June curves; otherwise satisfactory.

*Falmouth.*—The work was consistently good and the photography excellent.

*Fort William.*—Definition of lower edge not always good, and light very variable at times, suggestions were made that the lamp should be more frequently attended to. The tube was lowered ·230 in. on the 14th January, in order to bring the top of the mercury into focus during the prevalence of an extraordinary high-pressure system; the tube was raised again two days later.

*Kew.*—Instrument examined and cleaned on June 17th.

*Valencia.*—Tube lowered on the 14th January, at 10.55 a.m., of which day 30·990 ins. (corr.) was recorded. Tube was restored to its original position on the 16th.

## Thermograms.

*Aberdeen.*—The "dots" were raised on the 2nd March. Zero-lines changed from winter to summer position on 12th May, but returned to winter position four days later.

*Falmouth.*—Clock dismounted and cleaned on the 9th February, and new muslins and threads were attached to the wet-bulb on the 21st March.

*Fort William.*—An error of 5° in tabulating was repeated in the subsidiary check measurements. Complaints were made of the incorrect measurements, especially of the wet-bulb, probably caused by the imperfect setting of the glass scale. On the 3rd April the wet-bulb shield received a smart shock, but cause stated to be unknown. The zero-lines were changed from winter to summer position on the 10th May, and new muslins and threads were attached to the wet-bulb on the 29th of the same month.

*Kew.*—In February a note appeared on curve 55–56, "Wet-curve not tabulated owing to apparent irregular action." The atmospheric conditions were f. and temperatures low, a combination which renders it most difficult to determine how far the values are reliable, and in the notes for the work of the month a suggestion was made that extra attention should be given by the assistants to secure correct working of the instruments at such times. The case was investigated when it was found that the wet-bulb values were as much as 1° *higher* than the dry in places, and Mr. Whipple attributed the cause to the flaw in the wet-bulb tube described in M.O. 203S, 1890. From the

6th May to the 25th June a comparison was made between the two instruments as dry-bulbs, and the results showed that the wet-bulb instrument read 0·35 lower than the dry. (See M.O. 1160.) On the 29th June a new tube was fitted as a wet-bulb instrument, and steps taken to determine the scale and zero-line values. The "dots" were raised on the 11th May and zero-lines changed from winter to summer positions on the following day.

*Valencia.*—New muslins and threads were fitted to the wet bulbs on the 11th May.

GENERAL.

*Aberdeen.*—The work was good throughout, and instruments working satisfactorily.

*Armagh.*—In the absence of Dr. Dreyer the observation were taken by the Rev. Mr. Ferris, who changed the curves an hour earlier than usual, with the result that on these occasions some of the anemograph and rain curves are for 25 hours, others for 23 only.

*Falmouth.*—Very good in all respects.

*Fort William.*—Greater care is necessary in tabulating the thermograph curves.

*Kew.*—Great carelessness was apparent in the work of this observatory. In February there were five instances in which an error made in tabulating anemograph curves was repeated in the subsidiary sheet, although the two measurements are required to be made independently of each other.

*Valencia.*—The work of this observatory is fairly good.

T. E. ALLEN.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council :—

1. WARNINGS ISSUED.

SUMMARY.

| | | | |
|---|---|---|---|
| A + B | (successful) - - - - | = | 21 districts. |
| C | (failures) - - - - | = | 8 districts. |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

A fresh to strong gale from East was experienced in the south-west of England on the night of the 18th February. At 6 p.m. on the 18th a small depression was lying near the mouth of the Channel. The system was at that time very shallow, but at night it increased quickly in depth, and caused a gale to spring up on the coasts of Devon and Cornwall.

(Signed) FREDC. GASTER.

Telegraphic Branch,
February 24, 1892.

Mr. Scott reported that on the 12th instant he had received from an officer of the Board of Trade at Hull (Letter 303) a request for a return of weather over the North Sea for the space of three weeks. The charge of 5*s.* had been, as usual, made for the supply, and the official who had applied for the information objected to pay (Letter 321). Mr. Scott was instructed to inquire of the Board of Trade if their officer at Hull was duly authorised to make such applications (P.C. 396).

Submitted—The following list of publications which had been received since the last meeting :—

*Manchester, Sheffield, and Lincolnshire Railway.*—Monthly statement of rain fallen in the year ending 31st December 1891.

*Lang, C.*—Eine Skizze über Witterung und Influenza.

*Mill, H. R.*—Fourth and final report of the Committee appointed to arrange an investigation of the seasonable variations of temperature in lakes, rivers, and estuaries in various parts of the United Kingdom.

*Contarino, F.*—Sull' acqua latente del sottosuolo della Città di Napoli nell' anno 1890 ed in epoche anteriori.

*Köppen, W.*—Ueber mehrjährige Perioden der Witterung, insbesondere über die 11 jährige Periode der Temperatur.

*Calcutta, Meteorological Office, Bengal.*—Meteorological summary of the monsoon period of 1890 and 1891.

*Saussure, H.-B. de.*—Observations météorologiques faites au Col der Géant du 5 au 18 juillet 1788.

*Jenkins, B. G.*—The British Weather Chart. 1892.

63, *Victoria Street, March* 9 1892.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

| | |
|---|---|
| PROFESSOR DARWIN. | MR. STONE. |
| MR. GALTON. | THE HYDROGRAPHER. |

The Secretary was in attendance.

The Minutes of the last meeting (February 24) were read and confirmed.

Read—Letter 530 from Mr. Dines, forwarding his completed report on Anemometer Comparisons (Minutes, p. 73). Mr. Scott was instructed to forward it to the Royal Meteorological Society.

With reference to the remarks on the work at Kew (Minutes, p. 82) the following Minute was made:—

The Council regret to observe the frequent complaints made as to the unsatisfactory nature of the registers and tabulations forwarded to the Office from Kew, and they desire that Mr. Whipple's special attention should be called to the subject and that he should be requested to endeavour to secure more careful supervision of the registers in future by an experienced assistant.

Professor Darwin stated that he had learnt from Mr. Preece that the letter from the Council of November 1, 1890 (Minutes, 1890, p. 36), as to the proposed erection of the electrical anemometer on the Post Office Building, had not reached him.

Mr. Scott was instructed to forward a copy of that letter to the Secretary, Genera Post Office, stating that the Council would be glad of a reply to it, but that they themselves were not prepared to spend money on the repair of the instrument. The question of possible comparison of the instrument with a standard instrument to be reserved for subsequent consideration. (P.C. 513.)

Read—A letter from Mr. Baillie, stating that since last meeting seven logs had been received, five of them being "excellent." Mr. Scott was instructed to convey the marked thanks of the Council to the observers.

Read—Letter 424 from Captain Wilson Barker asking if the Council would supply instruments for a proposed station at Fernando de Noronha. The Hydrographer recommended that the request be granted, and the supply was authorized.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council:—

1. WARNINGS ISSUED.

| | |
|---|---|
| A + B (successful) - - - - | = 11 districts. |
| C (failures) - - - - - | = 2 districts. |

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNINGS WERE ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
9th March 1892.

Read—Letter 474 from Dr. Miller, of South Lambeth Road, stating that Mr. R. Canham was quite unfit to attend to his duties for a long time. It was resolved that he be granted six months leave from April 1 on half pay.

Submitted—The following report on the 8.30 p.m. forecasts for February 1892 :—

The letters used have the following signification :—

**a** = complete success. | **c** = partial failure.
**b** = partial (*i.e.* more than half) success. | **d** = total failure.

FEBRUARY 1892.

| Districts. | | Per-centages. | | | Per-centage of Success. a + b. |
|---|---|---|---|---|---|
| | | Wind. | Weather. | Average Forecast. | |
| SCOTLAND, N. | a | 28 | 59 | 44 | 78 |
| „ | b | 41 | 28 | 34 | |
| „ | c | 17 | 10 | 14 | |
| „ | d | 14 | 3 | 8 | |
| SCOTLAND, E. | a | 42 | 52 | 47 | 76 |
| „ | b | 31 | 27 | 29 | |
| „ | c | 24 | 14 | 19 | |
| „ | d | 3 | 7 | 5 | |
| ENGLAND, N.E. | a | 42 | 38 | 40 | 83 |
| „ | b | 31 | 55 | 43 | |
| „ | c | 24 | 4 | 14 | |
| „ | d | 3 | 3 | 3 | |
| ENGLAND, E. | a | 35 | 55 | 45 | 80 |
| „ | b | 41 | 28 | 35 | |
| „ | c | 14 | 10 | 12 | |
| „ | d | 10 | 7 | 8 | |
| MIDLAND COUNTIES | a | 48 | 55 | 52 | 72 |
| „ | b | 24 | 17 | 20 | |
| „ | c | 24 | 17 | 21 | |
| „ | d | 4 | 11 | 7 | |
| ENGLAND, S. | a | 48 | 58 | 53 | 78 |
| „ | b | 35 | 14 | 25 | |
| „ | c | 14 | 14 | 14 | |
| „ | d | 3 | 14 | 8 | |
| SCOTLAND, W. | a | 41 | 45 | 43 | 73 |
| „ | b | 28 | 31 | 30 | |
| „ | c | 24 | 7 | 15 | |
| „ | d | 7 | 17 | 12 | |
| ENGLAND, N.W. | a | 42 | 45 | 44 | 76 |
| „ | b | 34 | 31 | 32 | |
| „ | c | 21 | 10 | 16 | |
| „ | d | 3 | 14 | 8 | |
| ENGLAND, S.W. | a | 45 | 58 | 52 | 81 |
| „ | b | 38 | 21 | 29 | |
| „ | c | 10 | 14 | 12 | |
| „ | d | 7 | 7 | 7 | |
| IRELAND, N. | a | 48 | 55 | 52 | 78 |
| „ | b | 24 | 28 | 26 | |
| „ | c | 14 | 7 | 10 | |
| „ | d | 14 | 10 | 12 | |
| IRELAND, S. | a | 38 | 62 | 50 | 83 |
| „ | b | 41 | 24 | 33 | |
| „ | c | 14 | 7 | 10 | |
| „ | d | 7 | 7 | 7 | |
| SUMMARY. | | | | | |
| BRITISH ISLES | a | 42 | 53 | 48 | 78 |
| „ | b | 33 | 28 | 30 | |
| „ | c | 18 | 10 | 14 | |
| „ | d | 7 | 9 | 8 | |

**Submitted—The following reports of work during the month of February 1892:—**

MARINE BRANCH.

March 8, 1892.

Examined 10 new logs and 4 lighthouse registers.

Discussion of data in the district between the Cape of Good Hope and New Zealand. Obtaining mean pressure, and temperature of air and sea, and drawing isobars and isotherms for the month of February. A wind chart for this month is in course of preparation as a specimen of the method on which it is proposed to deal with the results. The information published in the "Meteoro-" logical Charts for the Ocean District adjacent to the Cape of Good Hope" (Official No. 43) is being added to the area now under discussion. The grouping of the winds for May and August in homogeneous spaces has been commenced. Observations in the logs of H.M. ships which have been obtained for current plotting are utilised in localities where data are scanty.

Specimen charts for the Red Sea prepared, containing remarks on the different phenomena exhibited, and submitted to the Council.

During the month the Public Record Office supplied 250 volumes of men-of-war's logs for Current Charts.

Preparing monthly charts of sea temperature for a portion of the North Atlantic Ocean west of the British Isles for a series of years.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 29th February 1892.)

*Weekly Weather Report.* 1891.—Summaries for November and December are in printer's hands; also title page and preface, with tables of average for pressure, temperature, rainfall, and bright sunshine. First proof has been revised.

*Weekly Weather Report,* 1892.—All numbers published promptly. Monthly summary for January, tables, and maps prepared.

*Daily Weather Report,* 1892.—All numbers issued promptly, and also correction sheet for January.

*Primary Checking of Storm Warnings.*—Done to date.

*Checking of Forecasts,* 8.30 *p.m.*—Done to date.

*Tables of Averages of Pressure, Temperature, Rainfall, and Bright Sunshine,* referred to in last report, have all been completed, put into type, and partially revised.

*Checking of Hay Harvest Forecasts,* 1891.—Nearly completed.

*Monthly Weather Summaries,* 1881.—Commenced by Mr. Brodie.

*Mr. Gaster* went to Biggleswade for one day, to give evidence for Midland Railway Company in a law case.

(Signed) FREDC. GASTER.

Telegraphic Branch,
9th March 1892.

PANTAGRAPH ROOM.

March 1, 1892.

*Hourly Means.*—The final sheets of results for the year 1889 are now in hand, and a portion of the "copy" has been sent to press. The whole of the tables for that year will be completed during the current month.

The means for 1891, required for the Kew Annual Report for that year, have been completed and forwarded to Mr. Whipple.

Some time has been occupied in connection with the scale for the bridled anemograms.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

March 1, 1892.

*Examinations.*

*October* 1891.—Completed.

*December* 1891.—Kew work completed.

Weekly examination (on receipt) of curves and documents from all observatories.

*Reports.*

*January–June*, 1891.—Tabular reports for each month, and combined report for Council
*September* 1891.—Copies of "Notes of Errors" to all observatories.
*October-December* 1891.—Copies of "Notes of Errors" to Kew.

*Miscellaneous.*

*Diurnal Range of Rainfall*, 1871–1890.—Completed.
General routine work.

(Signed) T. E. ALLEN.

Submitted—The following list of publications which had been received since the last meeting:—

*Trinidad, Royal Botanic Gardens.*—Annual report. 1890.

*Hall, M.*—Jamaica rainfall from 1870 to 1889.

*Dehra Dun, Surveyor General of India.*—General report on the operations of the Survey of India Department. 1889–90.

*Vincent, J.*—Cirro-stratus et alto-stratus.

*Peek, C. E.*—Meteorological observations at Rousdon Observatory. Vol. vii. for the year 1890.

*Trieste, Osservatorio Marittimo.*—Rapporto annuale . . . . . contenente le osservazioni meteorologiche e mareografiche di Trieste e le osservazioni meteorologiche di alcune altre stazioni Adriatiche per l'anno 1889. Vol. vi.

*Hamburg, Deutsche Seewarte.*—Tägliche synoptische Wetterkarten für den nordatlantischen Ozean und die anliegenden Theile der Kontinente. VI. Jahrg. Dezember 1886 bis November 1887.
—— —— Vierteljahrs-Wetter-Rundschau an der Hand der täglichen synoptischen Wetterkarten für den nordatlantischen Ocean. Bd. iii, Heft 1–4, 1885–1886.

*Stonyhurst College Observatory.*—Results of meteorological, magnetical, and solar observations. 1891.

*Nowack, J. F.*—J. F. Nowack's new system of meteorological and telluric forecasts, for land and sea.

*Adelaide Observatory.*—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the northern territory during the year 1889.

*Pesth, Königl. Ung. Central Anstalt für Meteorologie und Erdmagnetismus.*—Jahrbücher. xix. Bd., Jahrg. 1889.

*Monaco, Prince Albert Ier de.* – Sur une nouvelle carte des courants de l'Atlantique Nord. With chart.

*Tebbutt, J.*—Results of meteorological observations made at the private Observatory of John Tebbutt, the Peninsula, Windsor, New South Wales, in the years 1886–1890.

*Prague, Technisches Bureau des Landesculturrathes für das Königreich Böhmen.*—Ergebnisse der ombrometrischen Beobachtungen in Böhmen für das Jahr 1890.
—— —— Ergebnisse der Wasserstands-Beobachtungen an den Flüssen Böhmens für das Jahr 1890.

*London, British Association for the Advancement of Science.*—Report. 1891.

63, *Victoria Street, March* 23, 1892.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN. | MR. GALTON.

MR. STONE.

**The Secretary was in attendance.**

**The Minutes of the last meeting (March 9) were read and confirmed.**

**Mr. Scott submitted the subjoined correspondence with the Stationery Office:—**

(P.C. 498.)

SIR, Meteorological Office, March 5, 1891.

THE Meteorological Council, having had under their consideration how best to promote the diffusion of the information brought together in this Office and issued in the shape of the various publications which are printed on their account by the Stationery Office, have been led to the conclusion that the sale of these works would probably be much enlarged if some modification were made in the system under which the sales to the public now take place through a single establishment, that of Messrs. Spottiswoode & Co., which, the Council understand, has no shop for retail business in which these publications are exposed for sale.

They are informed that the terms on which Messrs. Spottiswoode & Co. obtain these publications from the Stationery Office are not such as to enable them to allow the usual trade discount to other firms who might otherwise assist in the sale.

The Council therefore would respectfully suggest that, with the consent of the Treasury, which, if it be requisite, might be sought, a somewhat larger discount should be allowed to Messrs. Spottiswoode & Co. on their undertaking to make the necessary further concession to retail booksellers, who would agree to offer the publications for sale in the usual manner.

The Council feel satisfied that by a moderate concession in this direction the sale of the publications of this Office might be so much enlarged as to more than cover any consequent reduction on the sum now received for the relatively very small number of copies sold at present, while additional means would thus be afforded for disseminating more freely information collected at a very considerable public expense, which has much practical as well as scientific value, in relation to matters in which the public interest is constantly growing.

The Council trust that in making such a concession it may be agreed to allow it to be tried for at least three or four years, as it will almost necessarily require the lapse of some time to bring an arrangement such as that suggested into practical operation.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Controller,
H.M. Stationery Office.

DEAR SIR, Stationery Office, March 19, 1891.

YOU might like to look at the minutes on the letter you left here. When you have done so and shown them, if you care to do so, to General Strachey, let me know what you think.

I have no objection, if you still wish it, to give authority for the experiment to be tried in the case of books issued after this date. It would hardly, I fancy, do to reprint the title-pages and raise the price of those already published. I could not recommend, and think you may probably take for granted that the Treasury would not consent to, the grant of a larger discount to the sale agents without a corresponding increase in the advertised price. Under the present arrangements the sale agents—of whom there are three, one each for England, Scotland, and Ireland—return to us two-thirds of the advertised price, and are bound to allow to retail agents at least a quarter.

Yours, &c.
(Signed) T. DIGBY PIGOTT.

R. H. Scott, Esq.

(P.C. 205.)

DEAR MR. PIGOTT, Meteorological Office, January 30, 1892.

THE letter from the Meteorological Office, relative to its publications and their sale, of the 5th March last, was not, as you may perhaps remember, replied to otherwise than by a note from you to me, with which you sent your office minute, which I now return. As the subject very likely has after the long delay that has since taken place passed from your memory, I also send you a copy of your note to me dated 19th March 1891.

In that note you said that you would, if we wished it, arrange as an experiment for an *increase* in the *selling price* of our publications, to be accompanied by a corresponding increase in the discount to be allowed to the sale agents.

Before adopting any conclusion on this proposal we thought it desirable to consult Messrs. Spottiswoode's representative, and from various causes this led to considerable delay; while the result of our communications was to throw doubt on the prospect of any advantage being derived from such an arrangement as had been suggested.

The question thus seemed one the difficulty of dealing with which had not been diminished by any suggestions yet made.

The subject having again been brought before the Council, they wish me to re-open the discussion with you. The general view of the Meteorological Council has been that the prices of the greater part of its publications are already fixed so high as to render their sale to the public, as a rule, impracticable, and that to raise the selling price, whatever discount was allowed to booksellers, would merely add to the difficulty of disposing of them, and not tend to remove it.

The Council is disposed to think that there would be a much better prospect of the Stationery Office obtaining a sale for these publications if the price was fixed in relation rather to the prospect of their being bought than to the actual cost of production. They are works of a very peculiar character, which would, in the majority of cases, only be bought by a small class of persons, and these most likely not in a position to pay considerable sums for them. The Council, therefore, is of opinion that as the publications are undertaken, so to speak, as a matter of public duty, to enable the scientific work of the Meteorological Office to reach the outside public, it leads in reality to an increase of charge on the Stationery Office so to fix the prices as to prevent sales; and that high nominal prices with no sales or very few are, in fact, economically much worse than low prices with improved sales. If the works are not sold, there is no use whatever in printing high prices on their covers, and any price that would not lead to an absolute reduction of total receipts would be advantageous, as it would lead to an increased diffusion of knowledge, presumably beneficial to the community, with no increase of ultimate cost.

What the Council, therefore, would suggest as the best way of dealing with the subject, is that the price of their publications should in future be fixed by consultation between the Stationery Office and the Meteorological Office, and should not be necessarily determined by the cost of production. Further, that a discount of 50 per cent. should be allowed to Messrs. Spottiswoode, on the understanding that they allowed to the trade the terms usually given by publishing houses, which is reckoned at 41⅔ per cent. discount.

The Council would suggest that this plan should be tried for, say, two or three years, when it could be reconsidered with reference to its practical results. One thing is certain, that having in view the present extremely small sale, these results could hardly make matters worse, and they might lead to valuable improvements.

Yours, &c.
(Signed) ROBERT H. SCOTT.

The Controller,
H.M. Stationery Office.

Mr. Scott further stated that in accordance with a request made to him at Munich, as Secretary of the International Conference, to prepare a Summary of all the Resolutions adopted at the several International Meetings (1872–1891), he had drawn up such a summary (making, on a rough estimate, over 100 quarto pages of type) and on the 2nd of February had forwarded it to the Stationery Office in the hope of its being printed. He had, however, held out no hopes at the Conference that the printing would be undertaken by the British Government. On February 6th he had received the subjoined letter:—

(M.O. 260.)

SIR, H.M. Stationery Office, February 4, 1892.

I AM desired by the Controller to acknowledge the receipt of a demand dated the 2nd instant for printing a "Summary of the Resolutions of the International Meteorological Congresses and Committees, 1872–1891," and to acquaint you that, in view of instructions received from the Treasury in 1889, he has felt obliged, before giving the order to the printers, to refer the demand to their Lordships.

The Controller has at the same time asked for their Lordships' directions on the proposal contained in your letters of the 5th March last and 30th ultimo for a reduction in the selling prices of the publications of the Council with an increase in the amount of the commission allowed to the sale agents.

On receipt of their Lordships' reply a further communication will be addressed to you.

I have, &c.
(Signed) J. S. LEWIS,
Assistant Controller.

The Secretary,
Meteorological Council.

Mr. Scott further stated that on March 12th he had written a private note to Mr. Pigott asking that the MS. of the Summary should be returned to him if the Treasury would not sanction the printing. He had on the 14th received the following letters:—

(M.O. 557.)

DEAR SIR, Stationery Office, March 14, 1892.

WHEN you re-opened the question of the reduction in the prices of your publications, I looked into the general question of our business relations, and came to the conclusion that the most satisfactory thing would be that your direct subsidy should be increased, and that you should pay for anything we might do for you, as do the Ecclesiastical Commissioners, and several other quasi-public offices.

I enclose a copy of the official letter sent to the Treasury.

By an odd coincidence the enclosed Treasury reply has reached me with your note of the 12th. Will you put in official form, so that I can send it on to the Treasury, your explanation of the necessity for the tri-lingual Summary? The manuscript is all safe. I am sending it now to the printing branch for the estimate asked of the cost.

Yours, &c.

R. H. Scott, Esq. (Signed) T. DIGBY PIGOTT.

(M.O. 557.)

SIR, Stationery Office, February 4, 1892.

WITH reference to the correspondence which passed between the Treasury and this Office in 1889 with regard to the arrangements to be made for printing required for the Meteorological Council, I have the honour to acquaint you that two questions have lately arisen which oblige me again to ask for further instructions from the Lords Commissioners.

1. In their letter (13,234/89) of 1st November 1889, their Lordships wrote that no increase in the rate of expenditure should be allowed "without first obtaining full and satisfactory explanation "from the Council as to the necessity for it."

A demand has been received to print, in three languages, a Summary of the Resolutions of the International Meteorological Congresses and Committees, 1872 to 1891. I am not in a position to judge how far the reasons for the order given may be satisfactory.

2. A request has been received that, with the object of pushing the circulation of the publications of the Council, the prices may be fixed at less than the cost, and a commission of 50 per cent., instead of 33⅓, allowed to the sale agents.

I am advised in view of the limited number of readers to whom these publications are of interest, and of the very large proportion of the copies printed which are issued to the Council—as shown by the statement annexed—presumably for gratuitous distribution, it is scarcely probable that, however favourable the terms on which they may be offered, the sale will be appreciable. So far, therefore, as concerns receipts by sales, it is immaterial on what principle the price or the amount of discount to be allowed may be fixed. But so long as the general terms on which Government publications shall be supplied to the sale agents are, as is now the case, regulated by contracts, there are objections to exceptions being made by the Stationery Office, which would not apply to the Council's publications if sold without the intervention of the Stationery Office.

For this and other reasons it would, perhaps, be more satisfactory if the Meteorological Council could be placed on the footing of a Repaying Department, with power to order any printing it required through the Stationery Office, and to dispose of matter printed in whatever manner the Council might think of the most advantage to the public.

The average expenditure of the Stationery Office for the Council during the three years last past has been 2,603*l*. The sums received for sales of its publications have, during the same period, averaged 59*l*. a year. The Council has then, in addition to the direct subsidy of 15,300*l*. granted by the Treasury, received from Stationery Office Votes an indirect subsidy of 2,544*l*.

If the direct subsidy were fixed at 17,850*l*. the Council would be substantially in the same financial position that it has been in during the last three years, with greater freedom of action, and perhaps more powerful incentives to economy in printing, and the gratuitous distribution of papers printed. All printing and other supplies ordered in ordinary course through the Stationery Office would be paid for by the Council, and the necessity for references to the Treasury, which there seems reason to think may otherwise become more frequent, would cease.

I have, &c.

(Signed) T. D. PIGOTT,

The Secretary to the Treasury. Controller.

LIST of the PUBLICATIONS of the METEOROLOGICAL COUNCIL issued since the 1st April 1891.

| — | Total Number of the Editions printed. | Number of Copies issued to the Council |
|---|---|---|
| Harmonic Analysis - - - - - | 350 | 300 |
| Hourly Means - - - - - | 300 | 275 |
| Arabian Sea Cyclone Tracks - - - - | 550 | 500 |
| Cape Guardafui Charts - - - - | 550 | 500 |
| Observations at Stations of Second Order - - | 300 | 275 |
| Quarterly Weather Reports - - - - | 300 | 275 |
| Weekly Weather Reports - - - - | 350 | 320 |

SIR, Treasury Chambers, March 8, 1892.

THE Lords Commissioners of Her Majesty's Treasury have had before them your report of the 29th ultimo, T.L. 40, further on the subject of the demand received from the Meteorological Office for printing a Summary of Resolutions of Meteorological Congresses, &c., in three languages.

My Lords observe that you state that no special explanation has been received of the circumstances under which this demand has been made.

The application to you appears to my Lords to be of a very unusual character, and they request that full information may be obtained with respect to it, and that particulars may be supplied of the estimated cost.

My Lords are much struck with the fact that the average expenditure of the Stationery Office for the Meteorological Council during the three years past has been 2,603*l.*, while the sums realized on sales has only averaged 59*l.* a year.

When the facts with regard to the present demand have been fully put before them, my Lords will take into consideration the question of the sale prices of the publications of the Council, and of placing the Council on the footing of a Repaying Department.

The enclosures to your letter are returned herewith.

I am, &c.
(Signed) FRANK MOWATT.

The Controller of the Stationery Office.

Mr. Scott was instructed to inform the Stationery Office that the Council would withdraw the proposal for printing the Summary, but to request the Controller to be so kind as to inform the Council of the estimated cost of printing. He was further permitted to explain the circumstances under which the Summary had been prepared. (P.C. 620.)

Read—Letter 564 from the Scottish Meteorological Society, requesting that the Council would kindly make a larger allowance to them for the returns which they supply to the Office.

Mr. Scott was instructed to make out by next meeting the amount which the Scottish Meteorological Society would receive, calculated on the same scale as that granted to the Royal Meteorological Society. (Minutes, p. 68.)

Read—A memorandum from Mr. Baillie, stating that since last meeting four logs had been received, two of them being "excellent."

Mr. Scott was instructed to convey the marked thanks of the Council to the observers.

Submitted—The following list of publications which had been received since the last meeting:—

*St. Petersburg, Physikalisches Central-Observatorium.*—Annalen. Jahrg. 1890. Theil ii.

—— *Kaiserliche Akademie der Wissenschaften.*—Repertorium für Meteorologie. Bd. xiv.

*Hellmann, G.*—Die erste Ballonfahrt zu wissenschaftlichen Zwecken.

*Milan, R. Osservatorio Astronomico di Brera in Milano.*—Osservazioni meteorologiche eseguite nell' anno 1891 da E. Pini.

*London, Meteorological Office.*—Report of the Meteorological Council for the year ending 31st March, 1891.

*Stuttgart, Meteorologische Centralstation.*—Meteorologische Beobachtungen in Württemberg. Jahrg. 1890.

*Assmann, R.*—Das Aspirations-Psychrometer. Ein Apparat zur Bestimmung der wahren Temperatur und Feuchtigkeit der Luft.

—— Aspirationspsychrometer.

—— Aspiration apparatus invented by Dr. R. Assmann at Berlin, constructed by R. Fuess at Berlin.

*Berlin, Deutsche Meteorologische Gesellschaft.*—Berliner Zweigverein der Deutschen meteorologischen Gesellschaft. Neuntes Vereinsjahr, 1892.

*Stuttgart, Königl. statistisches Landesamt.*—Mitteilungen. iii. Jahrg. 1891.

*Zürich, Schweizerische Meteorologische Central-Anstalt.*—Annalen. 1889.

*Washington, Signal Office.*—Charts showing average velocity and direction of the wind, prepared from observations for seventeen years.

*Vilafranca del Panadés, Observatorio Meteorológico.*—Observaciones. 1891.

*Weihrauch, K., und Oettingen, A. von.*—Meteorologische Beobachtungen angestellt in Dorpat in den Jahren 1886-1890.